



## Stakeholder's Attitudes towards the European Code of Conduct for Nanosciences & Nanotechnologies Research

# Synthesis Report

Based on the country-by-country findings of an stakeholder consultation process (electronic survey) and structured interviews or focus groups

Published under the NanoCode project as deliverable D2.3 for Work Package 2

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## SYNTHESIS REPORT ON STAKEHOLDER CONSULTATIONS

### SYNTHESIS REPORT ON STAKEHOLDER'S OPINIONS, ATTITUDES, EXPECTATIONS, NEEDS, OBJECTIONS AND PROPOSALS, INCLUDING A COLLATION OF INFORMATION FROM THE COUNTRY REPORTS ON QUESTIONNAIRES AND INTERVIEWS/FOCUS GROUPS.

Published under the NanoCode project as deliverable D2.3 for Work Package 2 (WP 2).

Based on the findings of the electronic survey on national level and within international organisations and the interviews / focus groups made at national level (one for each partner's country) (Deliverable D2.2)

NanoCode is a support action (SA) funded under the 7<sup>th</sup> Framework Programme (FP7) in the Science and Society Programme

#### Report Prepared by:

*Antje Grobe, Nico Kreinberger and Philippe Funda*, University of Stuttgart, Germany,

WP2 Leader

March 2011

The Commission Recommendation of 07/02/2008 on a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research is available at:

[http://ec.europa.eu/nanotechnology/pdf/nanocode-rec\\_pe0894c\\_en.pdf](http://ec.europa.eu/nanotechnology/pdf/nanocode-rec_pe0894c_en.pdf)

#### Contact:

Antje Grobe, University of Stuttgart, ZIRN

++49 (0)711 78 26 25 40 | [antje.grobe@soz.uni-stuttgart.de](mailto:antje.grobe@soz.uni-stuttgart.de)

[www.nanocode.eu](http://www.nanocode.eu)

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## Executive Summary

This Synthesis Report provides the findings of the international, quantitative and qualitative NanoCode Survey about the European Code of Conduct for Responsible Nanosciences and Nanotechnologies Research (EU-CoC). The results summarised in this report give insights into stakeholder's patterns of awareness, their expectations, attitudes and appraisals. The survey analyses the degree of compliance and commitment, identifies recommendations for the communication, possible incentives, disincentives and monitoring of the EU-CoC.

The Synthesis Report of the NanoCode Survey includes information from detailed Country Reports of the Consortium partners from seven EU-Member States (Italy, UK, France, Spain, The Netherlands, Czech Republic and Germany) and three Non-EU Countries (Switzerland, Argentina and The Republic of South Africa). In each of the Consortium partner countries, representatives from research, institutions, business and civil society organisations contributed to the quantitative survey. Additionally, a series of qualitative interviews and focus groups have been organised to deepen the country-specific attitudes and to develop detailed recommendations. Furthermore, a group of participants from international organisations based in Australia, Austria, Belgium, Brazil, China, Denmark, India, Korea, Liechtenstein, Mexico, Norway, Portugal and the United States answered the questionnaire and completed the colourful picture of comments and recommendations for the further development of the EU-CoC. An Assembled Report of the detailed Country Reports and one about the International Organisations is available at <http://www.nanocode.eu/>.

All in all, 304 European and international experts contributed to the NanoCode Survey between August and October 2010. Furthermore, about 150 experts had been involved in qualitative interviews or focus groups in the different countries between October 2010 and January 2011. With respect to this large and inhomogeneous sample, the results offer a surprisingly unambiguous tendency.

First of all, there is a broad general support of the EU-CoC principles with about 80% of agreement. The principle acceptance of the Code of Conduct is additionally visible in a two third majority of the participants who appraised the EU-CoC as an appropriate instrument for complementing regulation and for encouraging a dialogue about health, safety, environmental, ethical, social and legal issues. Only 15% thought that the Code is “not useful at all” for them.

Despite this high level of agreement to the EU-CoC in principle, a very low rate of adoption was observed in practice. Only about 20% of the participants stated that their organisation adopted the Code. About the half of the sample thought that their governmental bodies did adopt it. Unfortunately a rather optimistic view – only The Netherlands has so far formally adopted the EU-CoC. Several reasons were mentioned for this low level of compliance:

- Several recommendations could be assembled for a revision of the principles of “Accountability”, “Inclusiveness”, “Precaution” and “Sustainability”. For several governments and organisations a revision of the content and wording of the EU-CoC was identified as a precondition for further engagement and possible future adoption of the EU-CoC.
- Maybe due to this reason, governments did not communicate the EU-CoC as expected. Only 21% of the participants were aware of governmental activities to enforce the Code.
- However, the governmental level is not the only one with problems in communication: Only 15% of the respondents had been involved personally to take part in the debate about the EU-CoC.
- Only about the half of the identified key experts had heard about the EU-CoC prior the survey.

A serious lack of communication between the European Commission and the governmental bodies in the Member States and, in the next step, between the Member States' governments and the national key experts has to be considered. Without an improvement of the awareness and appropriate communication strategies for different target groups compliance will be fairly difficult to achieve.

Therefore, 78% of the participants suggested several improvements - some of them easy to adopt, some of them requesting for fundamental changes:

### *General revision of the EU-CoC*

In dialogues and consultation processes, the general focus of the EU-CoC should be reviewed with care due to the following patterns of argumentation:

- One group of qualitative recommendations advocates a broadening of the Code of Conduct to responsible research in general. It was argued that meaning, sustainability, precaution, inclusiveness, excellence and innovation should not be specifically targeted to nanotechnologies.
- Another group stated that if a Code of Conduct should focus nanotechnologies in a narrow sense, it should be much more specific including measurable criteria for the compliance of health, safety, environmental, ethical, social or legal measures - including a monitoring system and 'teeth' in the case of a non-compliance.
- Additionally, the EU-CoC should have a clearer profile (target group, instruments, incentives and monitoring systems) in comparison to other Codes of Conduct which are currently used by 62% of the participants.

### *Improvement of communication*

The majority of recommendations suggested an improvement of communication measures and dialogue activities on European level, national level and organisational level:

- European level: Dialogue processes for the revision of the EU-CoC, adoption in the official communication of the Framework Programmes, targeted workshops (researchers, students, business), an elaborated media strategy including web presence, publications in journals for certain peer groups, flyers, social media and blogs.
- National level: organising national workshops, platforms, Road Shows and "Day of Science"-formats
- Organisational level: management workshops, transformation of the EU-CoC in rules of safety management and organisational guidelines.

### *Several incentives had been suggested:*

- Funding of workshops and communicational measures, human resources and assistance for non-EU Countries.
- Using "Positive Labels", "Quality Marks" or "Ethical Labels" and publishing a list of researchers, institutions with their "best practice"-examples.
- Linking funding to a clear and measurable commitment to the EU-CoC, development of a quality control system, guidelines and rules.

Instead of encouraging compliance with the EU-CoC with incentives, more than half of the participants called for stronger restrictions, sanctions or penalties in case of non-compliance – the frequently discussed 'teeth' for the EU-CoC.

The suggestions followed an ascending ladder from a purely voluntary system for self-assessment, similar to auditing procedures to increasing public and economic pressure, up to a “*Naming & Blaming*”-system. The next steps were the linking of public funding of N&N research to compliance with the EU-CoC, and, as the final one, the requirement of a mandatory compliance. In the end, the description of the Code in this type of answers was far away from being voluntary and from its former aims to cover areas of high uncertainty until regulations can be implemented and to encourage dialogues among the stakeholders on important societal issues.

Summarising the results, several decisions about a review of the wording, of the scope and about the accompanying communicational concepts have to be taken soon, if the EU-CoC should not be seen as a “paper tiger” only.

The principle willingness of the participants to support the ideas of the EU-Code of Conduct was indeed visible in one of the last questions. More than 80% of the participants would be in favour of a simple web-based tool with more concrete explanations and implementable criteria for a responsible research on nanotechnologies. Therefore, the quantitative survey and the majority of the qualitative interviews are encouraging the European Commission to take further steps in the development of these commonly shared, important principles and their adaptation for nanosciences and nanotechnologies research – maybe in a more inclusive way.





# 1 Methodology and participants of the NanoCode Survey

## *Objectives of the NanoCode Survey*

The main objective of Work Package 2 and the NanoCode Survey was to explore what the identified key experts from the ten consortium's partner countries and from international organisations (WP 1) know about the European Code of Conduct for responsible nanosciences and nanotechnologies research (EU-CoC). The NanoCode Survey analyses awareness, agreement, attitudes, compliance, commitment and communicational measures from the perspective of different stakeholder groups such as researchers, institutions (including governmental bodies or large funding institutions), business and civil society organisations. Different questions tested the suitability of measurable criteria which could describe the level of compliance. The aim was here to prepare future supporting tools for the implementation and monitoring instruments. Various recommendations were collated for revisions, amendments, incentives and for the intended tool for a better implementation of the EU-CoC which will be developed in the next Work Package of the NanoCode Project (WP3).

## *Quantitative and qualitative methods*

For the NanoCode Survey two methods of empirical social research complemented each other:

- i) A quantitative electronic survey<sup>1</sup>, prepared by the University of Stuttgart (WP 2 leader) and conducted in the partner countries of the consortium figured out a large number of comparable responses with data for each country, from the group of the "International Organisations" and an overall analyses. The quantitative survey included closed (Yes/No) questions, five-point Likert scales to measure the level of agreement to a question, checklist questions, and open comment fields. The data were collected in a self-enumeration survey (without a supporting interviewer), analysed by SPSS and EXCEL tools.
- ii) Qualitative interviews (face-to-face, telephone or written) or focus groups took place in the partner countries with the aim to deepen the findings of the quantitative NanoCode Survey, to identify typical patterns of arguments, to elaborate reasons for them, and to develop further recommendations. The qualitative interviews could use different methods (individual interviews or focus groups) but they had to refer to the same shared interview guideline (prepared by the WP 2 leader) to gain comparable qualitative data.

## *Selection of the participants*

All project partners contributed to identify the relevant stakeholders and prepared a catalogue of national stakeholders as well as participants from different international organisations (WP1). Additionally, each partner was responsible to invite the identified experts to participate in the electronic survey with a personal mailing procedure (3 intended reminders and / or a telephone call if necessary). Key experts had been defined as persons with

- a role in planning, managing or funding of activities in research and development (R&D), its safety, quality or corporate responsibility or communication issues in their organization; or

<sup>1</sup> The NanoCode Survey Questionnaire is available at: [www.nanocode.eu/](http://www.nanocode.eu/)

- a role in planning or managing of international/national/regional or sector specific regulations, guidelines, voluntary measures and policies or funding strategies.

The NanoCode partners set up an expert-pool with key persons for the survey (WP1).

### *Responses to the NanoCode Survey*

A total of 304 responses were received for the quantitative survey. All partners deepened the findings with selected national experts of the survey in qualitative interviews. In the most of the consortiums' countries the list of survey experts who took also part in the qualitative interviews had been extended by not-answering key experts or recommended persons from special target groups. Overall, 118 participants took part in the qualitative interviews (face-to-face, personal telephone interviews, elaborated written answers) and 35 persons gave input in different national focus groups. A special benefit was provided by these qualitative interviews in the cases of the not-answering experts from the list of the quantitative survey. For example, a lot of the not-answering experts from the governmental bodies in the UK, in Spain and in Germany could be involved in the survey via these qualitative methods. Even in the Republic of South Africa an intensive debate was organised with focus groups in three different parts of the country to discuss the European Code of Conduct and its relevance for responsible nanosciences and nanotechnologies research in South Africa.

As shown in Figure 1, the response behaviour for the quantitative survey varied from country to country. Several reasons had been identified:

- Due to the different stakeholder communities in the partner countries (see the distinction in Type A-countries with a high proportion of nanosciences and nanotechnologies (N&N) activities and Type B-countries with a quantitative lower level of activities identified in the Synthesis Report of WP 1) a different number of experts had been invited to participate. For the European Countries it was intended to invite about 60 to 70 experts per country. For Argentina or the Republic of South Africa about 20 experts were expected to be identified as relevant for the NanoCode Survey.
- The response behaviour within organisations varied significantly – maybe in correspondence to national or organisational cultures. In some countries several participants of one organisation appreciated answering the questionnaire from their personal point of view or spread the survey amongst their colleagues in order to support the project with more responses (e.g. in France where approx. 1000 stakeholders had been invited). In other countries (e.g. Germany, Switzerland) the large research institutions, the leading companies and their powerful associations returned only one coordinated and consolidated response for each organisation- sometimes after longer consolidation phases. Even several governmental bodies coordinated their response in the sense of a national “one-voice”-strategy.
- Several key experts in countries with an intensive stakeholder debate (in the UK, The Netherlands, and Germany) showed some “symptoms of fatigue” due to the large number of surveys with questions about the EU-CoC and other Codes of Conduct they had been involved in over the last months and years. This was especially true for the researchers.
- Some of the stakeholders preferred to be involved in the qualitative interviews.
- In other countries (e.g. in Spain and in the UK) several governmental bodies had been in phases of a reorganisation. A lot of the invited experts had been totally busy or changed the position.

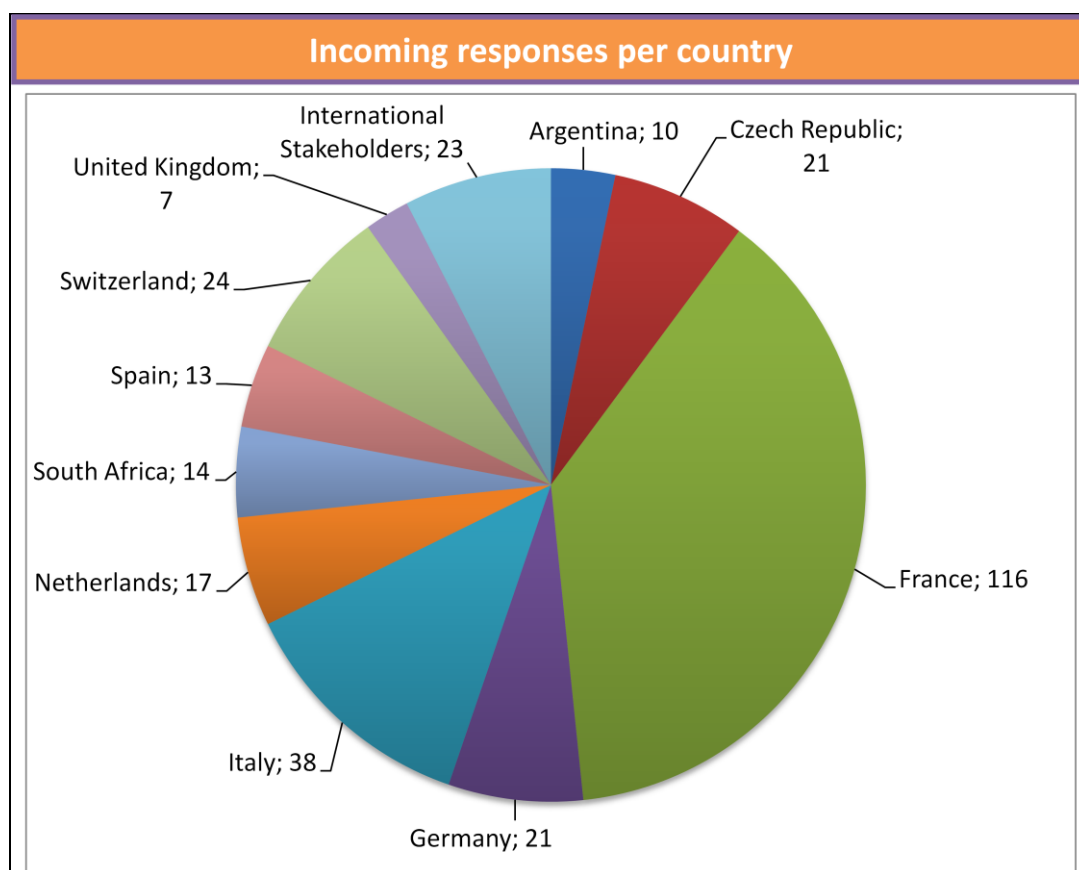


Figure 1: Incoming responses per country

Of course, the answering behaviour in France with 116 responses was a challenge for the analysis of the data. It had been tested if the French attitudes and the large number of answers had strained the results of the overall survey with 304 participants significantly. Interestingly, the French answers to the very most of the questions were pretty close to the average of the results of all other countries – sometimes they are exactly the same. In these cases France was like a mirror of the European attitudes.

Significant differences occurred in Questions 1, 17 and 22. As the following Chapter 2 will show, for example, the EU-CoC reached lower rates of awareness in the broadly spread French sample compared with other countries' proportions were only selected key experts had been involved. Additionally, the non-answering rate for various questions rose higher in France. Therefore, and in the sense of gaining valuable information from these interesting differences, it was decided to have a closer view to the single questions. The sample fraction differs in most cases from question to question and from country to country (some with a high volatility, some very constantly). It was analysed, if there really was a significantly higher proportion of French answers in a question; and, if yes, the occurring differences were discussed. It has to be emphasised that the results from France were highly welcome to generating ideas how the EU-CoC was perceived from a broader field of researchers who are maybe not the central key experts. However, each of them takes indeed a role in planning or managing activities in research and development, its safety, quality, corporate responsibility or communication issues in his or her organization and therefore all valid questionnaires were included in this analysis.

### Stakeholder distribution

Regarding the target group of the European Code of Conduct and the identified terms for the different stakeholder groups in WP 1, the sample distribution offers the following picture (c.f. Figure 2):

1. RESEARCH: Academia, industrial researchers, public research institutions, etc. (140 experts)
2. BUSINESS: Production, retail, insurance and finance, industrial/professional organizations, etc. (35 experts)
3. INSTITUTIONS: Policy makers such as governmental departments and agencies, R&D governing bodies, regulatory and standards agencies, technical and ethical committees, etc. (30 experts)
4. CIVIL SOCIETY: Non-governmental organizations (NGOs), consumer, patient/public health, environmental, labour associations, etc. (18 experts)

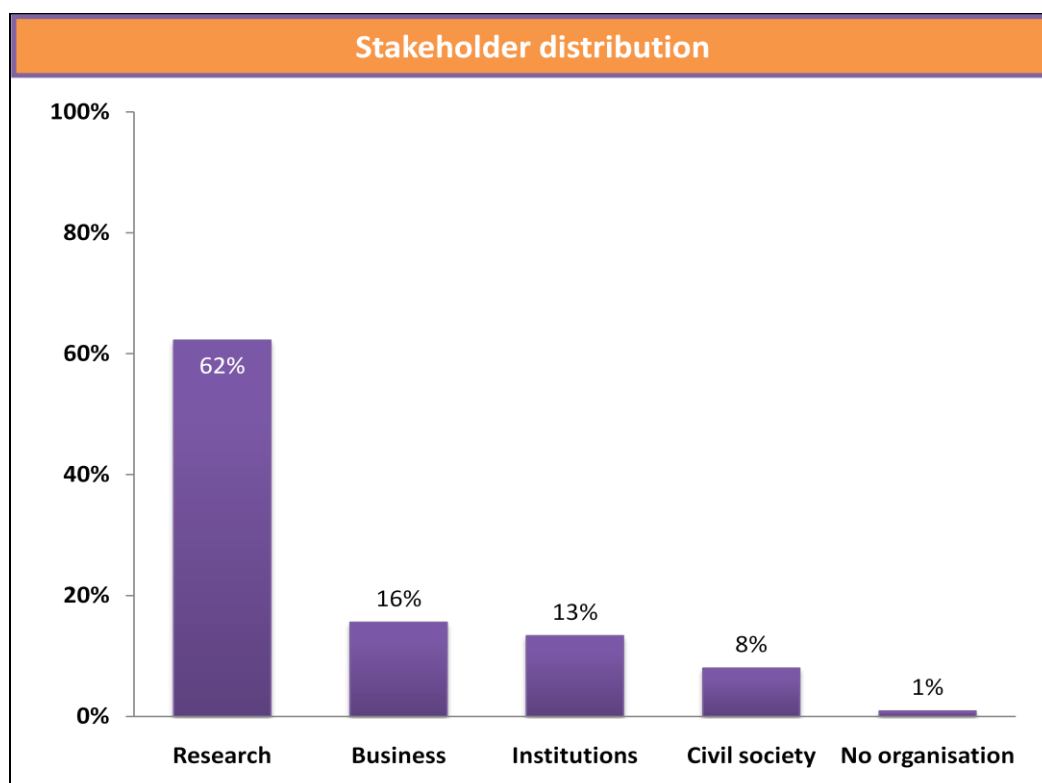


Figure 2: Stakeholder Distribution

Two other interviewees mentioned that they do not belong to any organization (e.g. retired experts) and another 79 respondents decided to answer anonymously.

## 2 Analysis of the current situation

The following section provides a detailed cross-national analysis of the current situation of the European CoC with regard to general awareness (2.1), agreement or disagreement to the EU-CoC principles (2.2), compliance, commitment (2.3) and communication (2.4). Furthermore, significant differences will be explored between the separate countries especially EU Member-States and non-EU Member-States.

### 2.1 Awareness of the EU-CoC

First of all, respondents were asked to tell if they had been aware of the EU-CoC prior to this survey (Q1). Although all interviewees were experts in nanosciences and nanotechnologies research (N&N), only 156 (52%) of 298 respondents seemed to be aware of it (c.f. Figure 3). Following a first working thesis, it was analysed if this result could be caused by the fact that also experts from Non-EU-countries and international organisations had been included in the survey. The results were a little surprise: if the respondents were separated into three groups – EU Member States, Non-EU countries and “International Organisations” – the results did not change much: Even in the EU Member States group, only 117 (51%) of 229 interviewees were aware of the EU-CoC. Also in the Non-EU group, 51% (24 respondents) said that they

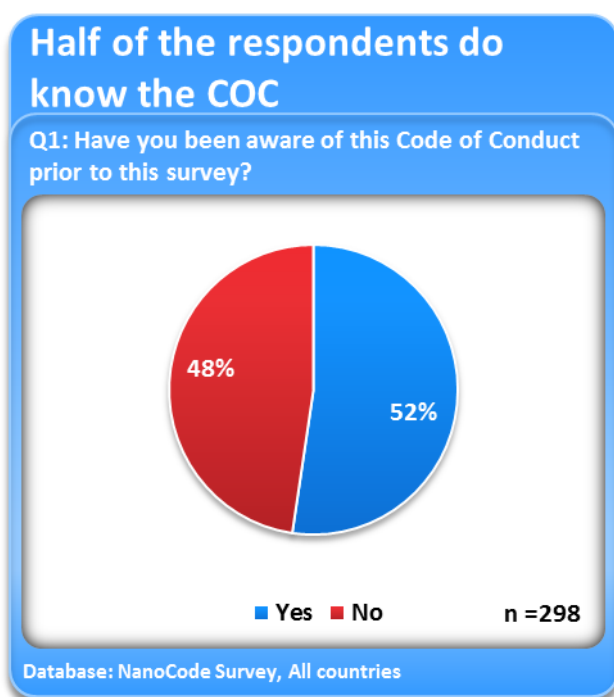


Figure 3: Awareness of CoC prior to survey

voluntary measures and practices towards a responsible development of N&N” which was published under the NanoCode project as deliverable D1.3 for Work package 1. In this report, countries were distinguished between those with relevant activities in N&N (Type A-countries: France, Switzerland, United Kingdom, The Netherlands, Germany etc.) and others with a quantitatively lower level of activity in N&N (Type B-countries: Italy, Spain, Czech Republic, Argentina, South Africa etc.). By comparing the survey data among these two groups, interestingly the same fifty-fifty proportion was visible. 52% of the respondents from Type A-countries were aware of the EU-CoC prior to this survey, and 50% stated to know the EU-CoC in Type B-countries.

were aware of the EU-CoC and 49% (23 respondents) said that they were not. In contrast to this fifty-fifty situation regarding awareness in the EU and Non-EU group, the international stakeholders showed the highest degree of awareness of all three groups of respondents with nearly a two-third majority. The reason for this high level of awareness could be that the most of them were key experts from central institutions which are closely co-operating with EU bodies. Furthermore 35% (Q14\_3) of the international stakeholders participated directly in several meetings and the consultation processes organised by the European Commission. Related to the group of EU and non-EU Member-States this is the highest percentage of personal involvement concerning the EU-CoC.

Another interesting point for building working thesis regarding the level of awareness had been identified in the “Synthesis Report on codes of conduct,

A closer view to the broader French sample delivers some explanations. Here, the majority of participants could be described as “normal” scientists in the labs, universities, research institutions and companies and not as central key experts. In this broader group of participants from all stakeholder groups – by the way the primary target group of the EU which should apply the EU-CoC in practice –, the level of awareness went down to about 30%. Counting the Type A-country results without the broader French sample, the awareness increased up to an average of 84% (58 out of 69); in countries such as The Netherlands and Germany nearly each of the participants knew the EU-CoC.

Limiting this optimistic data, it has to be regarded that several participants who stated to be aware of the EU-CoC noted in the comment fields that there would be basic knowledge *“but not in detail”*. Another typical quote was: *“I had heard of it, but never read it before”*. Therefore, general awareness of the EU-CoC should not be mixed up with a detailed knowledge as a basis for deeper appraisals.

This valuable insights lead to the following summary:

- ⇒ **Only in the group of key experts from the International Organisations and from Typ A-countries who had been closely involved by the EU-Commission the level of awareness of the Code of Conduct could be described as sufficiently high with about 70% who really know the CoC.**
- ⇒ **In the average of EU-Countries and non-EU-Countries the awareness is only about 50% in the narrow community of nanotechnology experts who had been identified as key experts too but who had been less involved directly. In broader samples of experts such as in France, the knowledge decreased significantly (about 30% awareness).**
- ⇒ **After more than two years of debate about the EU-CoC, the data suggests that the awareness is limited to a narrow community of selected key experts. The EU-CoC is not embedded in the every day life of the large majority of N&N researchers in Europe.**

## 2.2 Agreement / disagreement to the principles of the EU-CoC

The second survey question (Q2) focused, besides of the questions of previous knowledge, on the seven principles of the EU-CoC. These are meaning, sustainability, precaution, inclusiveness, excellence, innovation and accountability. Respondents were asked to appraise to what extent they agree to the content of these principles. The general result is that all seven principles were accepted by a large majority of respondents (c.f. Figure 4). Six of seven principles received an agreement of more than 80%. Interviewees agreed most with the principles of Sustainability (90%) and Excellence (90%). Only Accountability and Inclusiveness raised some opposition. Thereby, 52 (17%) of 296 respondents disagreed rather or strongly with the principle of Accountability. 11% disagreed with the principle of Inclusiveness.

A closer insight into the qualitative comment field exemplifies the reasons.

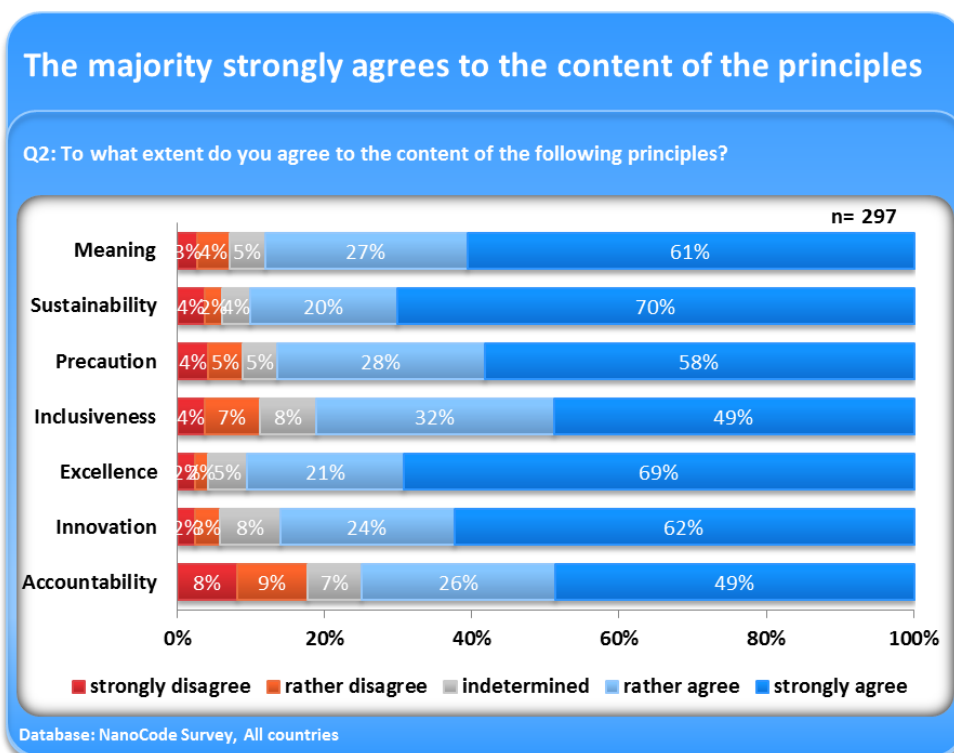


Figure 4: Agreement to the content of the EU-CoC principles

### The Accountability issue

The following section will list some critical arguments: Several respondents answered in the way that the Accountability principle is *“unrealistic with regard to researchers”* and should only be applied to companies which launch products to markets. Background of the majority of critical statements are difficulties in the translation or connotation of the term “Accountability” which is very close the the juridical term of “Liability” – for example in the German language area or in France. Other stakeholders believed that *“strictly obeying principle 7 could mean stopping research on N&N”* or that *“accountability doesn’t fit to open minded, creative and innovative research behaviour.”* The core of the disagreement was condensed pointedly by the following statement: *“Do you want to make Albert Einstein responsible for the atomic bomb in Hiroshima? It is always in the hands of the later generations what they will do with the inventions of their predecessors!”* Even in the qualitative interviews, the Accountability-issue was mentioned several times for example in Italy, France, The Netherlands, Germany and Switzerland. There, it was considered as *“particularly unfair to hold researchers accountable for impacts that their fundamental research may impose on future generations”*. In most of these countries it was concretely recommended to exchange the term “Accountability” with “Responsibility”. In the German stakeholder community there is a one-voice position that the Accountability principle should be adjusted before the debate about the adoption of the EU-CoC could go on. Even in countries with a rising community in the field of nanotechnologies such as Argentina and South Africa, the Accountability principle was commented critically: *“The issue that has been raised on content is the principle of accountability. The suggestion by the majority of participants in the quantitative survey is to have this expunged”*, so the South African report. The in-depth interviews in these countries deepened the impression that the concerns about the Accountability issue should not been interpreted as “negligible” due to the small number of participants who disagreed in the overall survey. It has to be taken seriously into account that several stakeholders requested the revision of the wording as a precondition of any further steps of adoption on the Member State level. The in-depth interviews



underlined the concern about this terminology. In several countries such as The Netherlands, United Kingdom, Germany and Spain important regulators only answered in the interviews or focus groups and not to the survey. Therefore, these quotes have to be weighted with special care.

### Inclusiveness

Compared to Accountability, only slight disagreement was received for Inclusiveness (11%). Interviewees substantiated that an inclusiveness of stakeholders and their concerns could be more appropriate for companies than for basic researchers. Another respondent in the in-depth interviews recommended in order to specifying “Inclusiveness”: *“Propose some selection criteria such as representativeness or competence for selecting NGOs”*.

### Precaution

Others remarked that the *“precautionary principle (and any associated administrative burden) should not block creativity and innovation”*; and, with a slightly cynical connotation, it *“is the best way to NEVER change/do anything.”* Furthermore, it was declared that *“Military applications are not able to meet the sustainability, precaution, accountability or inclusiveness criterions.”* Several respondents commented that the Precaution principle *“is not well balanced between potential risks and benefits and mostly centred on danger. The EU-CoC is useful only if it shows equilibrium between risks and benefits.”*, and they recommended a clear distinction between emerging and well known risks.

### Sustainability

Towards the Sustainability principle several quotes mentioned that: *“Sustainable development should take into account Human, Economic and Environmental factors in a well-tuned proportion.”* Here again, the balance between risks and benefits of N&N for a more sustainable future should be balanced appropriately.

### Further comments on a possible revision of specific terminologies

Other comments regarded the wording of the GUIDELINES ON ACTION TO BE TAKEN which are provided in the EU-CoC. Here, section 4.1.17 about risk assessment and long-term safety was mentioned explicitly as too broad. *“Strict implementation of Section 4.1.17 will lead to a moratorium on certain types of research in nanomedicine, nanofood and nano-enabled personal care products. The Commission should seek methods to further specify the targeted instances, for example, differentiate between naturally occurring nanoparticles and man-made nanoparticles.”* Several other comments went to the wording of the principles and its guidelines. The first comment referred to the term “moral threat” with the following recommendation: *“Specify the terms ethical research, delete the term moral threats for it makes no sense.”* A second one said: *“Avoid unrealistic propositions like ‘next generations’”*. The next recommendation was more general: *“Implement the legal and ethical value of scientific freedom or put more emphasis on it.”*

### Different levels of agreement / disagreement

Analysing the data, a clear difference could be made between Type A-countries and Type B-countries just as well as between EU- and non-EU Member States. Thereby Type A-countries as well as EU Member States had a much higher degree of disagreement with the CoC principles than Type B-countries, non-EU countries and the cross national sample. For example, the principle of Accountability reached a disagreement of 22% in Type A-countries and 19% in EU-countries. Obviously, countries with a relevant activity in N&N are more



sceptical about the EU-CoC than others. Independent from that point, the seven principles of the EU CoC achieved a clear agreement in the cross-national sample. Or to make it short:

- ⇒ **Overall, the principles of the EU-CoC are very well perceived. A support of about 80% of the participants is a very sufficient basis to any further development.**
- ⇒ **The more the stakeholders know, the more criticism is raised.**
- ⇒ **It could be recommended to adjust crucial terms or passages as suggested (example of Accountability) if they are serious burdens to adopt and communicate the EU-CoC in principle.**

### *The EU-CoC as an appropriate instrument*

After respondents were asked about their general agreement to the seven principles, they should appraise whether the EU-CoC would be an appropriate instrument to implement the principles in their view (Q3). In the cross-national sample, 178 (75%) of 237 interviewees indicated the EU-CoC as an adequate instrument for implementing the principles (c.f. Figure 5).

Again it might be helpful to differentiate the overall sample like it was done above. According to our findings, Type B-countries (86%) and non-EU Member-States (83%) had a slightly higher level of agreement. In both groups the agreement was over 80% while the EU Member-States (74%) and, amongst them, the Type A-countries (70%) lay slightly under the cross-national average, likewise the group of International Stakeholders (63%).

However, this is a very comfortable majority of participants who appraised the voluntary EU-CoC as an appropriate instrument to implement the seven principles.

In this question the French sample did not influence the results significantly; it showed the same average like the EU Member-States (76%). Some concerns on the effectiveness were mentioned only in the group of Type A-countries and within the group of International Organisations. Most respondents saw the EU-CoC as a starting point and were indecisive about its assertiveness. Correspondingly, one respondent stated “[Y]es, it is a step while regulation is not established. However it is insufficient, since it has no enforcement power. Mandatory regulation is needed to ensure the development of the potential of nanotechnology while minimizing risks.”

- ⇒ **A large majority appraised the EU-CoC as an appropriate instrument to implement the seven principles – this result seems to be independent from the degree of involvement and knowledge of the experts.**

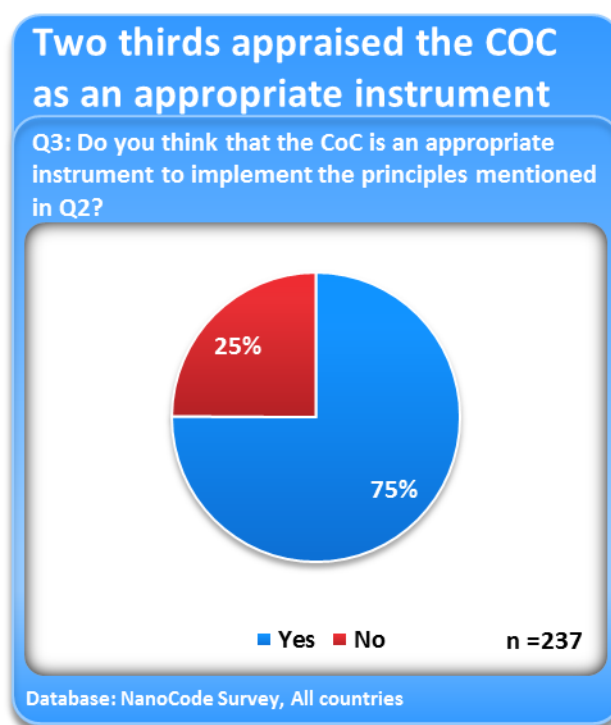


Figure 5: CoC as an appropriate instrument for implementation

- ⇒ Following the expert debate in some countries about the concerns – for example on the Accountability issue – the large support for the EU-CoC as an appropriate instrument gives a comfortable basis for further developments.

### Expectations towards the EU-CoC

As Figure 6 shows, respondents were asked about their expectations for what purpose voluntary codes could be assessed as useful.

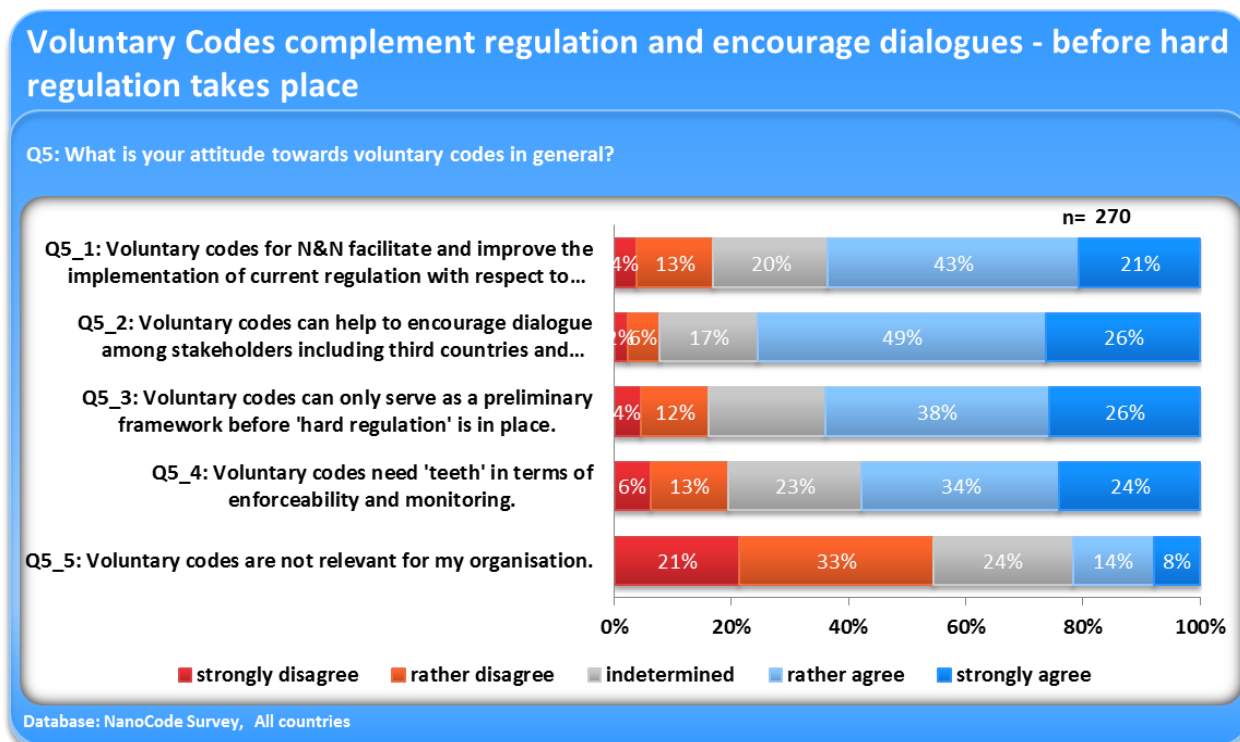


Figure 6: Attitudes towards voluntary codes in general

In the cross-national sample, 169 (63%) of 266 respondents saw voluntary codes as an opportunity to facilitate and improve the implementation of current regulations on environmental, health and safety issues (EHS) and ethical, social and legal implications (ELSI) (Q5\_1). 75% of 270 stakeholders indicated that such codes could help to encourage dialogue amongst them (Q5\_2). It was seen by 64% as a preliminary framework before hard regulation would be installed (Q5\_3) and 58% of the respondents answered that voluntary codes need ‘teeth’ in terms of enforceability and monitoring (Q5\_4). Finally, only a small proportion (22%) of the interviewees answered that voluntary codes were not relevant for their organisation (Q5\_5). This very significant result deepened the overall support of the principles and the Eu-CoC as an appropriate tool in general.

However, the majority of participants (58%) added, that voluntary codes should have “teeth” in terms of enforceability and monitoring. If a comparison is done with regard to the different stakeholder groups there is obviously a clear tendency for a mandatory character of the EU-CoC amongst the interviewees. The stakeholder groups of research, business, institutions and civil society showed a very similar tendency of answering patterns. In the research group 56 % called for “teeth”, in the business group 22 (66%) of 33 respondents favoured sanctions and 17 (56%) of 30 interviewees from the governmental bodies indicated the same. Concerning the civil-society-group 12 (76%) of 16 respondents answered they agree with ‘teeth’,

whereas 2 (13%) did not. Resulting from these facts there is no possibility to make a clear difference between various stakeholder groups. Most of the respondents agreed with the requirement of stricter

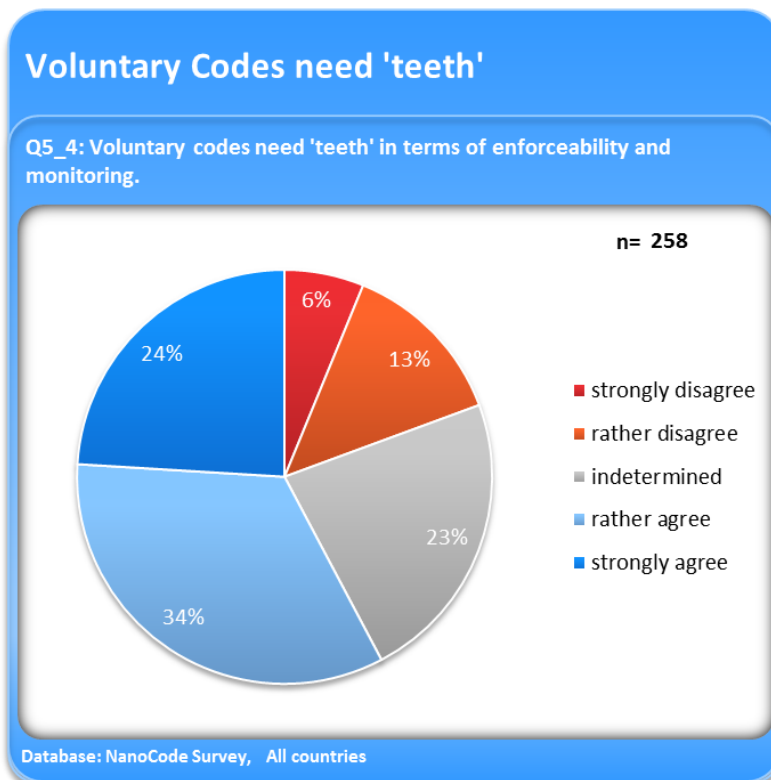


Figure 7: Need for enforceability and monitoring

*are much more realistic and implementable than the legal obligations. I experience several voluntary very positive initiatives and most of them were not accepted by the MEPs because they come from the "bad" industry [...]."*

- *"Hence we can start with voluntary while hard regulations are being put in place."*

In these quotes respondents comment on voluntary codes in a thoroughly realistic way – sometimes more or less sceptical – even though they are positive about the sense of such a code in general. Condensing the results it could be said that voluntary codes as a framework are seen as highly relevant

- ⇒ **if they can help to cover areas of high uncertainty until regulations can be implemented;**
- ⇒ **if they can encourage dialogues among the stakeholders on important societal issues; and**
- ⇒ **if appropriate measures are in place to enforce and monitor compliance to the code.**

## 2.3 Compliance and commitment to the EU-CoC principles

An important indicator for a successful implementation is the compliance on the EU-CoC within the stakeholder groups. Therefore interviewees were asked if their organisation or their country did or intends to adopt the European Code of Conduct on N&N (c.f. Figure 8). The answer to the first question (Q7\_1) disclosed a low adoption on the organisational level.

measures concerning enforceability and monitoring of the EU-CoC. Here are some quotes from the qualitative answers:

- *"[A] Voluntary approach that does not have enforcement has proven to be non-functional in the past. Why should the case of N&N be expected to be an exception?"*

- *"Voluntary approaches to regulation have generally not been successful from my perspective unless they are used by regulatory bodies to gain experience in an area of high uncertainty. Even then, success is not guaranteed."*

- *"Voluntary codes can also be a cover for delay or other unproductive behavior on the part of those the code would cover."*

- *"Voluntary codes or initiatives*

Before going into details, it has to be considered that in this phase of the survey – when participants had to go into concrete – the answering rate went down to 118 responses only. Of course, this decrease is influenced by the number of participants from non-EU Countries, which have no possibility to adopt the EU-CoC officially. However, about 20 of them answered the question (“My organisation / governmental bodies do not / do not intend to adopt the CoC”). This could be a hint that a large number of EU-participants preferred not to answer this concrete question.

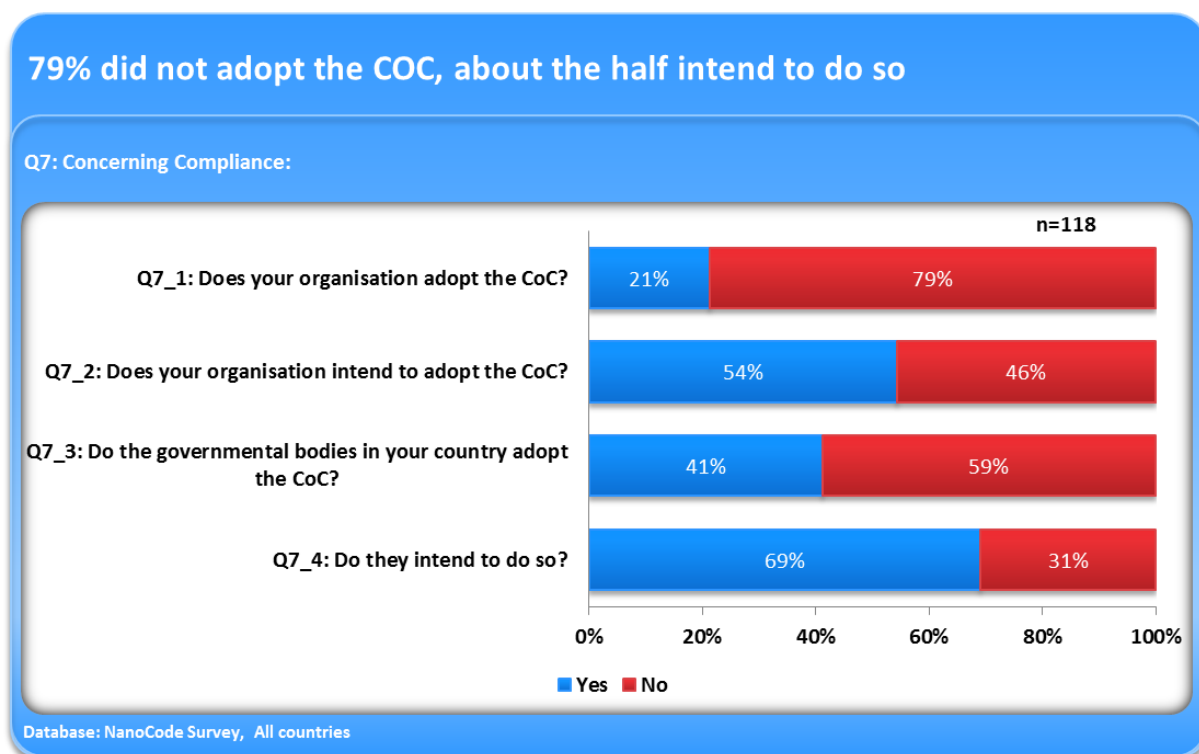


Figure 8: Adoption of the EU-CoC or the intention to do so

Only 25 (21%) of 118 respondent's organisations adopted the EU-CoC. Amongst those there are several institutions who are closely involved in EU research programmes or scientific networks. In the EU Member States 24% of the participants confirmed the adoption by their organisation. None of the non-EU organisations adopted the EU-CoC - what is no surprise and just affirms the accuracy of answers. No significant difference is visible between Type A- (22%) and Type B-countries (21%). Nevertheless, more than 50% of respondents stated that their organisation intends to adopt the EU-CoC (Q7\_2).

Interestingly, 41 % thought that their governmental bodies had adopted the EU-CoC. A clear difference appeared here between Type A- and Type B-countries. Also the question if the governments intend to adopt the EU-CoC shows this difference: the participants from closely engaged countries behaved much more cautiously. In avoidance of creating a wrong picture it has to be underlined that only 92 interviewees answered this question. This means that the large majority preferred to give no comment on this. Additionally, it has to be mentioned that a lot of the answers have to be interpreted as “wishful thinking” due to the fact that during the period of the survey only The Netherlands have adopted the EU-CoC officially.

Independent from decreasing response rates in this item, it has to be pointed out that the high agreement to the principles of the EU-CoC did not affect commitment and adoption of the Code in a positive way – or in other words:

- ⇒ **A large majority of stakeholders are delighted by the (very most of the) principles – but talking about concrete implementation of the CoC, one earns a lot of silence and “declarations of intent” rather than real examples of adoption.**

Interviewees explained their reasons in different ways. The main reason is the adoption of other codes:

- *“In my institute there is a CoC concerning the truthfulness of the research (in general).”*
- *“It is part of the Company Ethic to follow the most stringent security and environmental policies of all countries in which it operates.”*
- *“My organisation does not adopt the specific CoC for Nanotechnology as we are overall committed to handle all research in a precautionary way.”*
- *“We apply this [company] code naturally and implicitly since the beginning of our company. We do not need an additional formal approach like the EU-CoC.”*
- *“We have our own Code of conduct for R&D, industrial and commercial nanotechnologies activities.”*

The qualitative statements could explain the apparent contradiction between the agreements towards voluntary codes in general and towards the seven principles in particular and the low level of concrete adoption. If there are similar Codes of Conduct adopted by the organisations, the basic attitudes towards such voluntary codes must be positive, while a concrete adoption of the EU-CoC is not necessarily in the main interest any more.

The next question will elaborate this hypothesis and ask for the application of similar voluntary codes, principles or guidelines (c.f. Figure 9).

At least, 61% of 146 respondents in the cross-national sample claimed to apply other Codes of Conduct or guidelines. The percentage differs between 60% and 65% among non-EU and EU Member States, Type A- and Type B-countries. Interviewees named a great bandwidth of related codes, which are listed here:

- *“Animal ethics, green science, standards including OECD, ISO, EPA.”*
- *“As a legitimate organisation we follow certain CoC in general.”*
- *“At present we have performed the first step of an EMAS certification which principles partly overlap with the EU-CoC.”*
- *“Bioethical research codes”*
- *“CEA Guidelines, best practices see [www.nanosmile.org](http://www.nanosmile.org)”*
- *“Cenarios, periodically check of state of the art of all products”*
- *“Code of Conduct for Researchers”*
- *“Code of conduct from the joined network “NanoBioNet””*

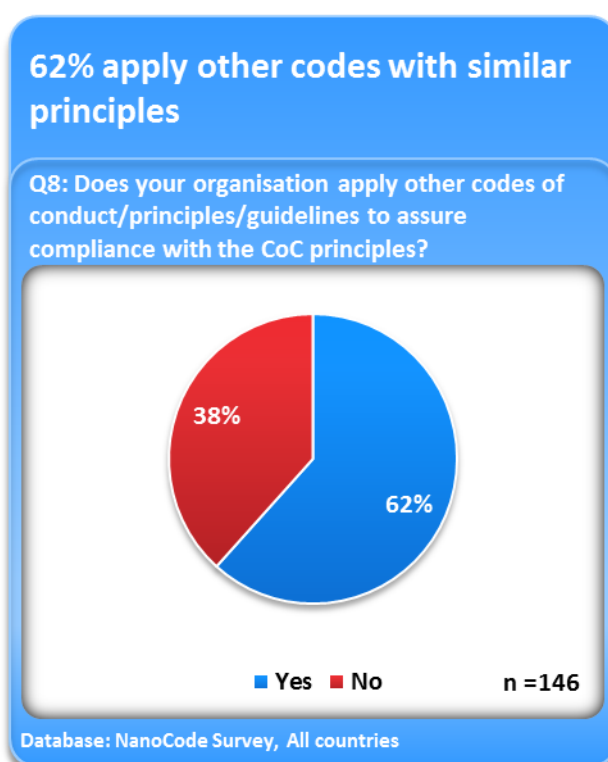


Figure 9: Assurance of compliance with CoC

- “GLP for example and ethical committee” / “GMP” / “REACH”
- “Basic principles for the responsible use of nanomaterials”  
[http://www.bmu.de/files/pdfs/allgemein/application/pdf/nanokomm\\_abschlussbericht\\_2008\\_en.pdf](http://www.bmu.de/files/pdfs/allgemein/application/pdf/nanokomm_abschlussbericht_2008_en.pdf)
- “Best practices, nano guidelines” / “risk assessment guidelines”
- “Code of Conduct for retailers”  
[http://www.innovationsgesellschaft.ch/media/archive2/publikationen/CoC\\_Nanotechnologien\\_deutsch.pdf](http://www.innovationsgesellschaft.ch/media/archive2/publikationen/CoC_Nanotechnologien_deutsch.pdf)
- “Internal rules of working with nanomaterials in HSE policy”
- “ISO 16000”
- “ISO 9000, RoHS, ISO 14000, CEN”
- “My institute is a.o. ISO, GLP certified. These quality systems are in line with the intentions of the EU-CoC. There is a Dutch Law regarding my institute which states that all our activities, reports, etc. should be made publically available.”
- “Nanosafety Guidelines”
- “Precautionary principle, no data - no market”
- “Principles of NanoKommission”
- “Responsible care, product stewardship, precautionary principle, own guidelines”
- “The Max Planck Society for the Advancement of Science recently adopted its own CoC which handles the questions mentioned in the nanocode as well, but in a more general manner.”

In the light of these numbers of Codes and relevant guidance documents<sup>2</sup> which the participants mentioned a currently applied in the organisation, it has to be figured out if the EU-CoC will be able to replace or to summarise some of the existing codes. The next question will be: What could be done to encourage an official, explicit adoption? Another approach could be that an implicit coverage could be taken into account if the principles of the EU-CoC are well represented within the other codes. In the view of a large majority of the participants a lot of the EU-CoC principles are clearly addressed and covered by their own codes of conduct, principles or guidelines.

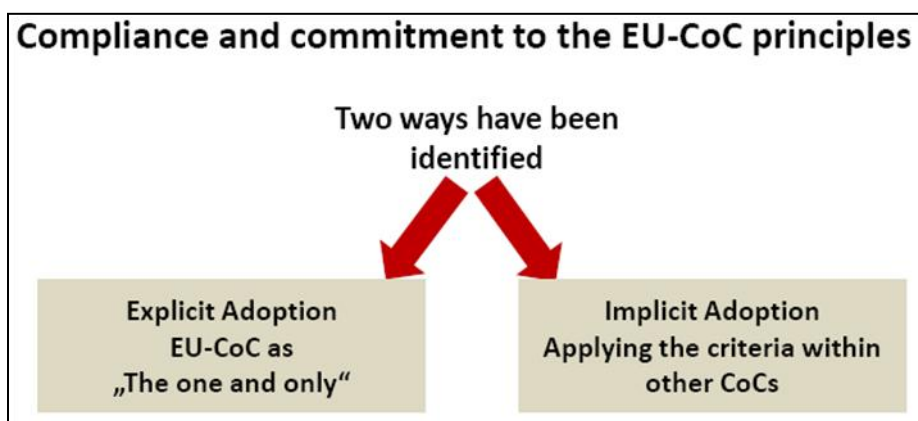


Figure 10: Two ways of compliance and commitment

<sup>2</sup> See WP 1 of the NanoCode project with an overview on the currently discussed Codes of Conduct

Regarding this multitude of answers it will be the challenge to show why the EU-CoC for N&N research is the better choice for voluntary activities to gain trust in a responsible research of nanotechnologies. There are two ways to proceed:

- ⇒ To communicate the EU Code of Conduct as the “one and only” Code which is relevant for European nanosciences and nanotechnologies research and encouraging an explicit adoption, or
- ⇒ To find indicators to measure implicit adoption of the EU-CoC principles by identifying concrete criteria which are taken up – or not – in the voluntary initiatives, codes or guidelines adopted by the respective stakeholders.

## 2.4 Measurable indicators for compliance

The following questions (Q9, Q10 and Q13) indicate the appropriateness of possible measurable indicators for the compliance with the Code’s principles.

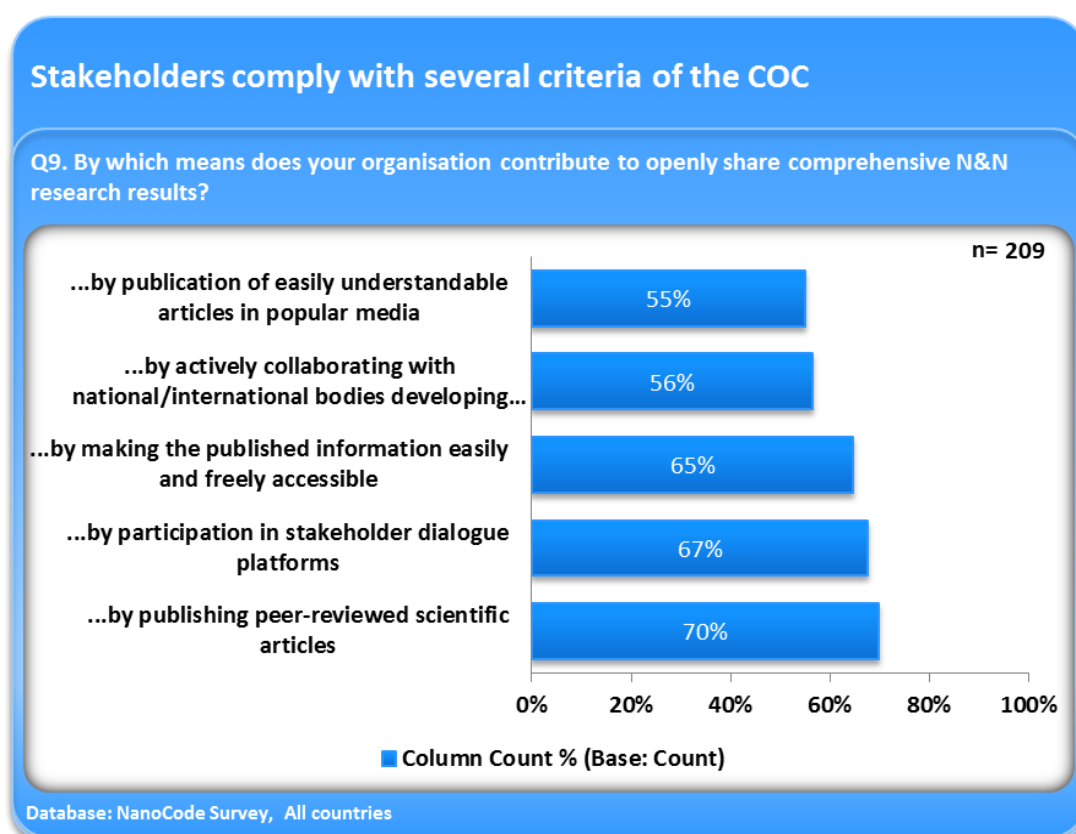


Figure 11: Means of contribution to openly share N&N research results

As shown in Figure 11, there are several ways to share comprehensive N&N research results with the public. The following order of preferences occurred: publishing peer-reviewed scientific articles (70%), participation in stakeholder dialogue platforms (67%), making published information easily and freely accessible (for example via internet) (65%), collaborating with national and international bodies (56%) and by publishing in popular media (55%). Due to the large proportion of researchers in the sample, the high level of peer reviewed publications was expectable. However, an information strategy for the broader public including openly shared, comprehensive results still remains a challenge, if the main activities are publishing peer reviewed articles. Here, the transfer of scientific data into commonly shared knowledge



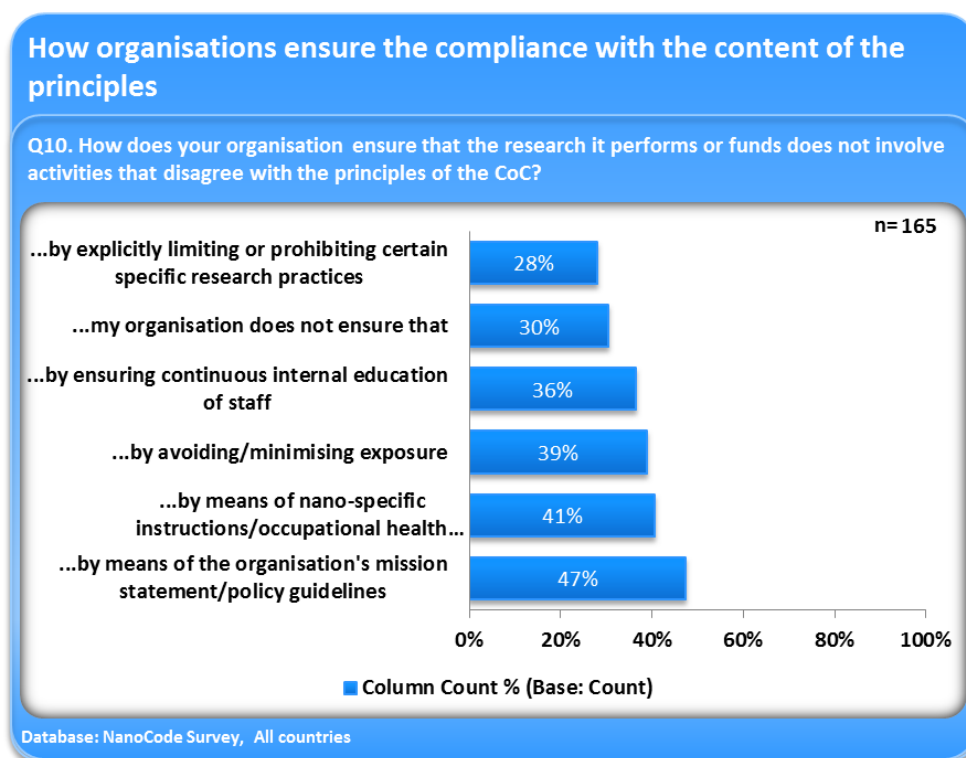


Figure 12: Ensuring of compliance with the content of the CoC principles

28% of the organisations are explicitly limiting specific research practices. 36% stated to invest in continuous internal trainings and about 40% applied measures to minimise exposure. For more than 40% these activities are described in nano-specific instructions and guidelines or in the organisation's mission statement. Interestingly, even 30% said that their organisation does not ensure that the research it performs or funds does not involve activities which are contrary to the EU-CoC (c.f. Figure 12). These 30% could be interpreted in a positive way that hopefully 70% do ensure this. But interpreting the data in this way should be done with care – we cannot draw valid conclusions about the not-answering group. The analysis of the respondents included some surprises: in the group of the 30% (N=50) respondents who denied ("my organisation does not ensure that"), only 7 interviewees came from non-EU Member-States while 43 were EU Members and International Stakeholders. Thereby, 31 of those 50 who denied that their organisation ensures that activities won't disagree with the principles of the EU-CoC came from European Type A-countries. This result could be interpreted as a hint that there is a larger group of organisations even amongst the well informed participants, who are not covering the principles by applying similar measures. For the EU this could mean that there is further need for improving the general awareness of the EU-CoC and its principles as a first step.

which is accessible by different stakeholder groups - for example to ensure the principle of Inclusiveness -could be an even more difficult task compared to publications from scientists to scientists.

The next figure shows some other criteria how the participant's organisations ensure their compliance with the content of the principles.



In the next Question (Q13) participants had been asked how their organisations ensure the identification of potential negative impacts of the N&N research they perform or fund (c.f. Figure 13). A method preferred by 82 (67%) of 123 interviewees were participatory foresight exercises or public debates on ethical, legal and social issues.

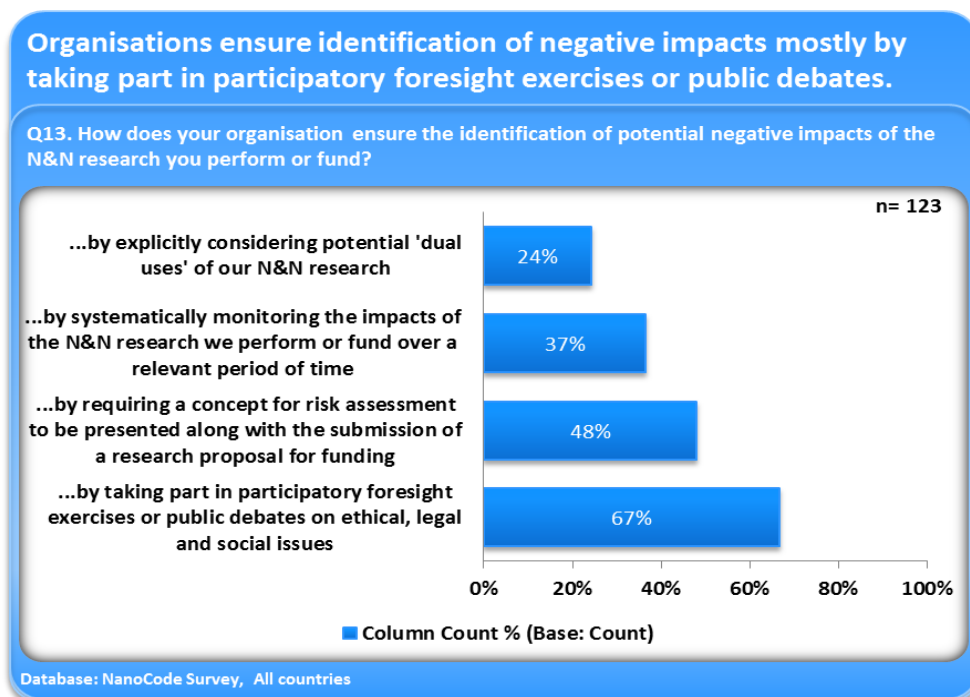


Figure 13: Ensuring of identification of negative impacts of N&N research

48% of the organisations require a concept for risk assessment as a precondition for the funding of research projects. 37% have monitoring systems in place for analysing impacts of the research over a relevant period of time and 24% are considering potential dual uses.

Clear differences could be identified in this question between Type A- and Type B-countries. For example, 80% of the Type A-Countries' participants took part in participatory foresight exercises, but only 44% of the Type B-Countries' respondents. Maybe the opportunities to take part in such debates could be more restricted in Type B-countries.

The analysis of the discussed results suggests the following conclusions

- ⇒ All of the above listed criteria and indicators allow a broad band of interpretation. Not much is known about how organisations ensure compliance with their own code's and initiatives' principles in practice. Nevertheless, these criteria and the ways how they are implemented in the different voluntary initiatives could be used as a valuable input for the design of tools to assess compliance with the EU-CoC principles.
- ⇒ The information about the criteria could be applied to both, to an explicit adoption of the EU-CoC or individual ways of an implicit adoption of the principles via other Codes of Conduct.
- ⇒ For the development of an assessment tool, it would be recommendable combining the identified criteria with concrete examples ("...by taking part in participatory exercises (such as ...)") and to ask for significant evidence (such as participation certificates, publications, risk

assessment reports, monitoring results or documents of the organisations' communication activities) to underline the statements made in the assessment tool.

## 2.5 Communication

The following chapter investigates the communicational structures how the EU-CoC had been disseminated and how far the experts had been involved in the debate. The results are fairly disappointing as the figures will draw out.

### 2.5.1 Dissemination and communication at the governmental level

In the initial question the interviewees had been asked if they were aware of governmental measures to enforce the EU-CoC (c.f. Figure 14). The results were outstandingly clear. Only 20% of 246 respondents were aware of such measures from their governments. By differentiating these results into three groups – International Stakeholders, EU Member States and non-EU countries – the results are even more irritating. Only 18% of the EU-participants are aware of measures of their governments while 29% of the respondents of the Non-EU countries claimed that for their governments. Could it be that the EU-Member States' governments are more silent about the EU-CoC in comparison to those from outside?

It has to be pointed out that Argentina and the Republic of South Africa answered this question with focus on a Code of Conduct but not especially the *European* CoC. Switzerland has amongst the Non-EU states the highest awareness with 38% what is probably caused by their geopolitical location and due to strong

connections between researchers and research projects in Switzerland and the EU. Independent from that, the results from the EU Member States remain remarkable. The Netherlands had the highest rate of awareness for those measures (33%), in Germany only 29% had heard of governmental measures to encourage the EU-CoC, in France only 17% observed governmental activities in this field and Italy or the UK possessed a relatively low awareness (7%) regarding governmental measures.

Considering the clear support for the EU-CoC principles and towards voluntary codes as an appropriate tool in general, these results suggest a significant lack of communication on the level of national governments. If about half of the survey participants had heard about the EU-CoC prior to this survey and only about 20%

know something about encouraging activities of their member states, the formal communication chain is far away from being sufficient. Any organisational adoption or formal compliance is difficult to achieve, if

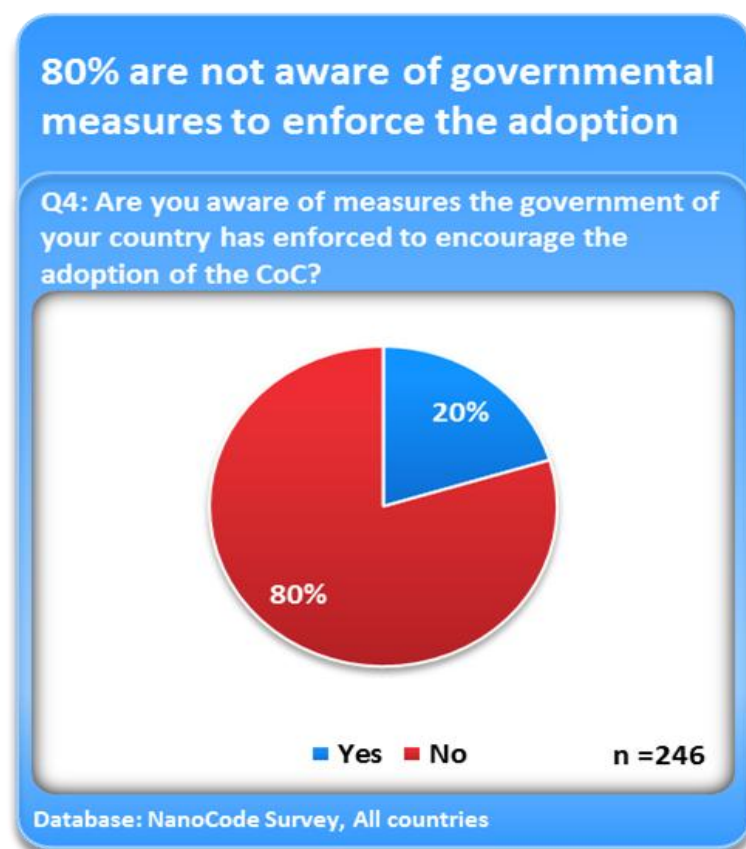


Figure 14: Awareness of governmental measures to encourage the EU-CoC

the national governments are not active in supporting these measures by an efficient communication. Some of the interviewees directly mentioned their disappointment about the missing communication. One quoted: *“Government communication to the public is more than lousy”*. Another said: *“I haven't heard anything on this topic, and the French national debate on nanotechnology has not yet received a formal conclusion”*. Many comments went into the direction: *“If there is something, it is not visible. Bad marketing?”* Others draw a linkage between serious concerns about the content of the EU-CoC and the way of communication: *“If the government were to encourage the adoption of the CoC, it would also indicate that there might be something “special” and possibly negative about nanotechnology and nanomaterials and the government does not want to draw any such attention to nanotech.”*

In the qualitative country-by-country in-depth interviews and focus groups several reasons for the governmental “Strategy of Silence” were explained (see the Assembled Report of WP 2, available on [www.nanocode.eu](http://www.nanocode.eu)). For example, the German participants from governmental bodies and from the large research institutions stressed that the EU-CoC should be adjusted at first – as suggested in several official statements. Then, a formal adoption could be examined again as a basis for a governmental recommendation. In the British and Spanish interviews participants from the governmental bodies reasoned the lag of an active communication with structural problems. Several key persons had changed the position, resources had been re-allocated and the awareness about the EU-CoC debate within the new group of representatives of public authorities was comparatively low.

The following conclusions can be drawn from these hints:

- ⇒ **The EU should involve the Member State governments into the dissemination activities of the EU-CoC in a better, more efficient way if the serious lag in the formal communication chain should be closed.**
- ⇒ **Former activities should be reviewed carefully to find out the reasons for hindering. Direct, face-to-face interaction could be recommended.**
- ⇒ **Several consultations had taken place in the last years. However, the results and consequences have not been broadly disseminated. Too many of the respondents have no clear idea of the status quo of the debate. This should be a task of the EU-Commission and the related bodies.**

## 2.5.2 Personal involvement

According to the awareness of governmental measures, participants were asked about their personal involvement in the debate about the EU-CoC by the European Commission or related bodies (Q14, c.f. Figure 15). The results show a similar tendency as described in the previous section. Only 15% of 235 interviewees were contacted directly by the EU to take part in the debate. Within the EU Member States 17% of the respondents said that they had been contacted directly by the EU. Taking into account that the participants had been identified as key experts in this field, the level of direct involvement is particularly low. Interestingly, among the experts from the International Organisations the level of involvement went up to 21%.

Finally only 45 (19%) of 233 stakeholders who answered this question took part in the EU consultation process concerning the EU-CoC.

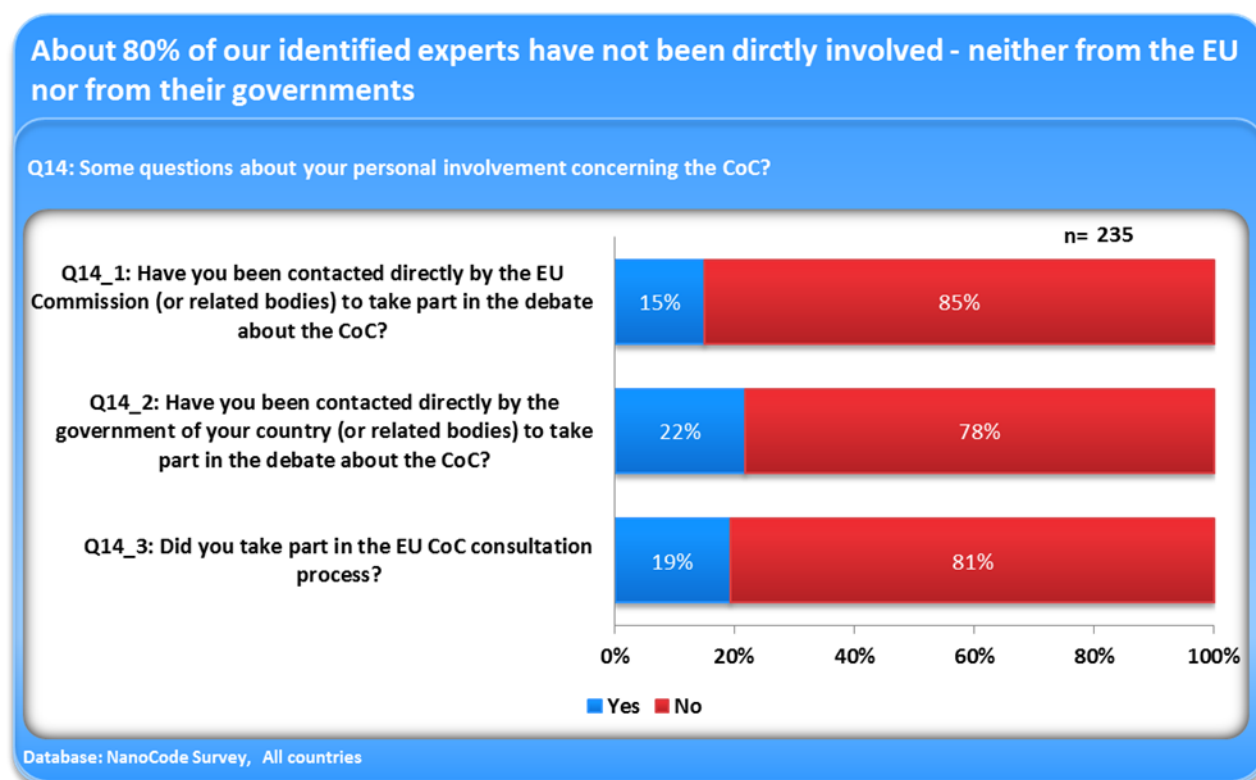


Figure 15: Involvement concerning the EU-CoC

The results could give a hint that a future communication strategy to enforce the EU-CoC should include a broader group of relevant key experts personally, independent from the official adoption of the Member States' governments. However, first of all, these key persons have to be identified. The results in the cross-national survey concerning responsibility for enhancing awareness, dissemination and monitoring of the EU-CoC (Q16, Q20) were extremely heterogeneous - sometimes even inconsistent in the same stakeholder group. In none of the participating countries a clear and unified answer regarding such responsibilities occurred. Various governmental institutions were named in each country. Accordingly, it will be a challenge to identify responsible persons and structures to improve the communication about the EU-CoC.

Some of the recommendations of the participants from the qualitative comment fields could be taken as a conclusion:

- ⇒ **The EU-CoC is perceived as a “good idea with a bad marketing”. The ways of direct involvement can certainly be improved – which holds particularly true for the researcher’s group.**
- ⇒ **Responsibilities for a targeted communication should be identified. The national Country Reports do provide valuable insights into this question (see the Assembled Report available at [www.nanocode.eu](http://www.nanocode.eu))**
- ⇒ **In order to enlarge the group of involved experts, the list of experts who had been identified in WP 1 of the NanoCode-Project could be a useful first step.**

### 2.5.3 Dissemination at organisational level

In the light of the low level of involvement, the following results had not been a surprise. Only between 8% and 20% of the organisations mentioned the EU-CoC in their internal or external communication. The total response rate decreased to 175 answering participants. That means that about half of the sample preferred not to answer.

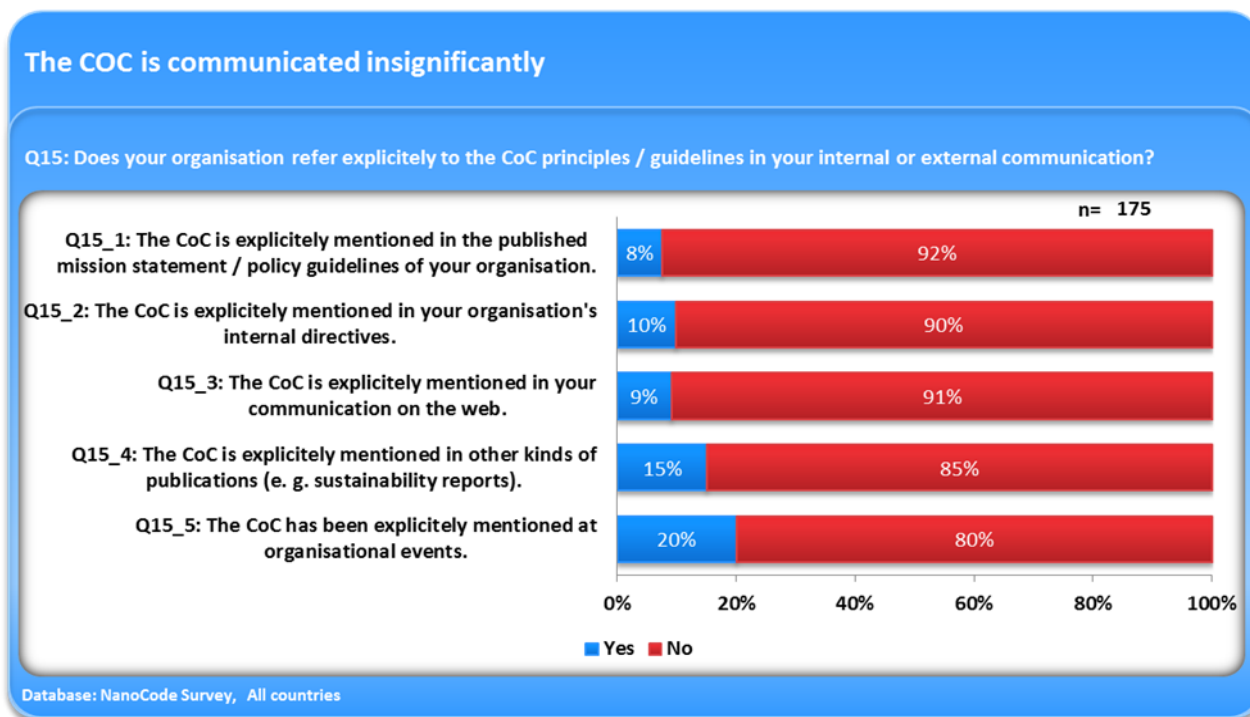


Figure 16: Internal or external communication explicitly referring to the EU-CoC

Merely 14 (8%) of 175 respondents stated that the EU-CoC was mentioned explicitly in policy guidelines or published mission statements (Q15\_1). In internal directives it was not mentioned by 90% of the interviewed stakeholders (Q15\_2), likewise 91% of the interviewees negated any hint to the EU-CoC in their web communication (Q15\_3). An insignificantly higher number of references to the EU-CoC were recognized in other kinds of publications (15%, e.g. sustainability reports) and at organisational events (20% of the respondents (Q15\_4, Q15\_5)).

Of course, this result seems to be disappointing again. As a conclusion the following statements could be summarised:

- ⇒ **The EU-CoC communication from the EU-Level to the national governments and from the national governments towards the relevant national organisations has to be improved significantly. The communication chain is clearly interrupted; as a possible alternative, direct involvement of experts did however not take place either.**
- ⇒ **However, the survey questions on the organisations' communication about the EU-CoC or its seven principles could be used as a hint how future monitoring indicators could look like, if awareness and compliance would improve.**

### 3 Recommendations from the survey participants

The following chapter will collate the recommendations from the survey participants regarding a possible review of the scope and content of the EU-CoC (section 3.1), and it will discuss ideas for an improvement of the awareness and of further dissemination activities (section 3.2). Some of these recommendations were given in the qualitative comment field of the survey. Most of them had been elaborated by the 150 participants in in-depth interviews or focus groups country-by-country. Here, they developed and discussed creative approaches for incentives (section 3.3), for monitoring systems, sanctions and penalties – or in short- how the “teeth” could look like (section 3.4). Explicitly, the necessity and possible elements of a web based tool had been investigated (section 3.5).

#### 3.1 Improvement or changes of the scope of the EU-CoC

As described above, there is, on the one hand, a broad support for the principles and the EU-CoC as an appropriate tool. On the other hand, the dissemination and communications has to be described as insufficient and the adoption is far away from a successful implementation on the Member States level and on the organisational level. Several recommendations refer to the scope, and – as it could be expected in such a diverse sample - the participants did not suggest only one solution.

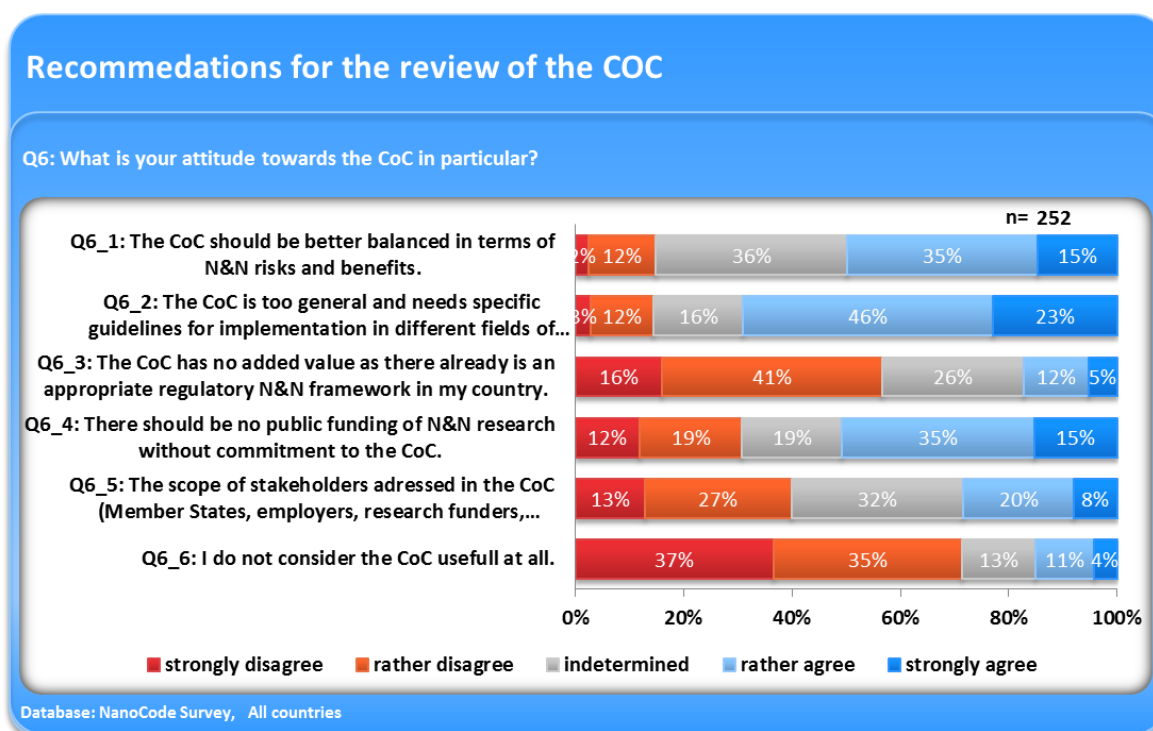


Figure 17: Recommendations for the review of the CoC

First of all, about half of the participants wished a better **balance of risks and benefits** in the EU-CoC’s principles. The second questions asked if the EU-CoC would be perceived as too general. Here, and in the following interviews, two types of arguments occurred:



## 1. The EU-CoC should be more specific

69% said the EU-CoC is too general and needs specific guidelines for different fields of application (c.f. Figure 17). Several quotes addressed the issue how the EU-CoC could be broken down to a more practical and understandable level. They included concrete criteria to monitor compliance of health, safety, environmental, ethical, social or legal measures), but also talked about a monitoring system and “teeth” in the case of non-compliance (see section 3.4). The Netherlands group suggested a differentiation between different types of materials such as embedded nanostructures, nanostructures, nanostructured materials and nanomaterials. *“The current European Code of Conduct’s ‘one-size-fits-all’ approach will have no effect on the target groups, and will instead have negative impact on risk communication and nanotechnology innovation.”*, said one of the Dutch researchers summarizing the debate. Recommendations from Italy (coming from industry representatives) went in a similar direction: *“The document is too general. It should clearly refer to situation related to high concern (i.e. free nanoparticles, not all nanotechnologies).”* One of the German researchers made some very pragmatic suggestions: *“If I – as a basic researcher in the field of dermatology – should integrate ethical, legal and social questions in our project, I would need, first of all, a data pool of social scientists (I’m in close contact to the colleagues in my field of science but I know only very few social scientists), and secondly we would need more funding in the calls dedicated to these questions.”* Another Italian participant gave additional practical hints which should be included in a more concrete version of the CoC: *“Reference to specific standards and regulatory provisions suitable for nanotech application could be included in the document”*.

## 2. The EU-CoC should be much broader

A second group of participants recommended nearly the opposite: a broadening of the EU-CoC towards responsible research in general. It was argued that meaning, sustainability, precaution, inclusiveness, excellence and innovation should not be specifically targeted to nanotechnologies. The French group stated in their country report: *“This CoC will be applied if, and only if, it is not limited to one discipline but made available to all sciences. A new version of this Code should consider Research & Development in general rather than Nanoscience in particular.”* Or to bring it just to the point: *“CoC principles are basic ones, accepted by any scientist”*, as one member of the Spanish group stated. A lot of arguments against a Code which is referring to nanotechnologies only have been discussed in the previous chapters. A typical quote was here: *“My organisation does not adopt the specific CoC for Nanotechnology as we are overall committed to handle all research in a precautionary way.”* This type of arguments was underlined most of all by large research institutions and funding bodies as well as from researchers in large companies who have a stake in different technologies.

It is not possible to assign these two types of answers to specific stakeholder groups. Both types are well represented in all stakeholder groups and in all countries of the NanoCode partners. This could lead to the assumption that the observed contradiction could be a principle problem of the scope of the EU-CoC. The French group has developed the following Figure 18 which was intensively discussed within all project partners and agreed to be of high relevance for the understanding of basic reasons for hindering a better communication and adoption of the EU-CoC. In the French Country Report, three different overlapping target communities have been identified. It was concluded that different sentences – even in the GUIDELINES ON ACTIONS TO BE TAKEN – could be assigned (labelled) to specific target audiences.

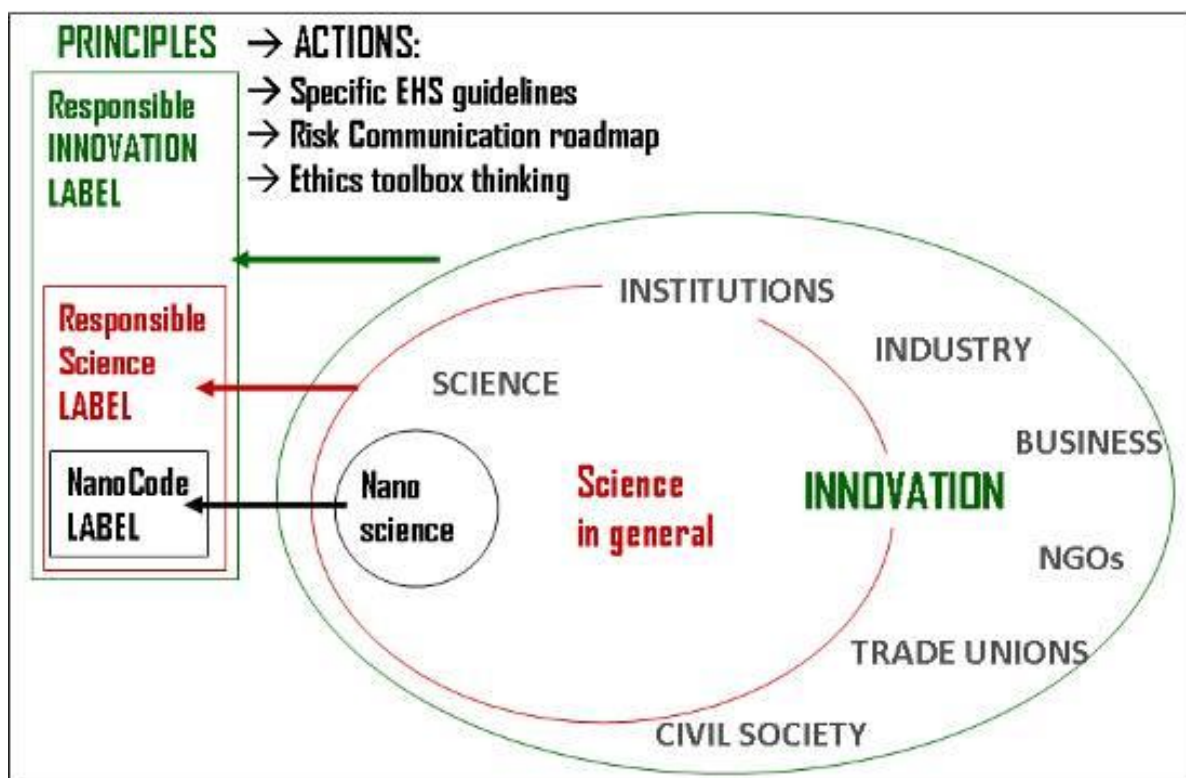


Figure 18: Overlapping target audiences of the EU-CoC (Source: Country Report France)

This figure enlarges the problem toward a third dimension: the target group of innovators in general and not only to research and science as special interest groups in this system. The Group from Argentina recommended in a similar approach that a specific code for nanotechnologies should include the whole activities and not only those of research. They suggested an explicit inclusion of production and commercialisation. Additionally, they recommended reflecting “*the assurance that the principles can effectively be followed over the entire life cycle (e. g. waste management and disposal, use of toxic agrochemicals, etc.)*” which was described as a challenge due to the lack of appropriate infrastructure and capacities in administration. For sure, these important elements of a responsible application of nanomaterials are not in the responsibility of the researchers and have to be addressed adequately. The principle problem with these overlapping targets is manifested in the debate about the Accountability issue as discussed above.

The following consequences have to be drawn cautiously:

- ⇒ If the EU-CoC should be kept with its focus limited to N&N research, it could either be revised towards providing more concrete recommendations how nano-specific activities should be handled, or some kind of guidance should be provided which allows monitoring of compliance with the EU-CoC’s principles and guidelines.
- ⇒ Linking compliance with the EU-CoC to the procedure of allocating public funding to N&N research is an option to be explored. If so, funding calls and structure should refer to the requirements of the EU-CoC.
- ⇒ If the EU-CoC should be used as the basis for reflection in areas of high uncertainty until regulations can be implemented and to encourage dialogues among the stakeholders on important societal issues, it has to be revised too. The wording should be reviewed with the aim



that no “hidden teeth” could be interpreted. Then, the EU-CoC could only serve on a strictly voluntary level “without any teeth”.

- ⇒ If the EU-CoC should underline the general principles for researchers and research projects funded by the EU, the nanospecific sections have to be adjusted towards a more general focus.
- ⇒ If the EU-CoC has to be adjusted, a decision about the target of the Code has to be taken too – or alternatively, two documents have to be developed.

In any case, the survey and the interviews and focus groups deepened the impression of overlapping target groups and concurring aims within the EU-CoC. Therefore, several decisions have to be taken before consistent adjustments can be recommended.

### 3.2 Activities to improve awareness and dissemination

Independent from the future decision making processes, the results of the NanoCode Survey provide a number of ideas to improve the general awareness and the disseminations process in general.

The following section is a compilation of recommendations coming from the different partner countries. Interestingly, most of the recommendations follow similar patterns. Therefore, no distinction was made between different countries or the group of EU and non-EU Countries. In general, the participants had identified their needs for different communicational measures on the European level, on the national level and on the organisational level:

#### *European Level*

##### **Dialogue processes**

- All stakeholders should be involved in rewriting the EU-CoC in order to facilitate future communication.
- Communication strategies should initiate a transparent dialogue process conducted in an atmosphere of mutual trust and be specifically adapted to the different Member States’ situations.

##### **EU-Communication**

- Embedding the EU-CoC into the Framework Programmes - named explicitly as a precondition for funding.
- Communicate that funding of nano-related projects is coupled with a declaration that the research organisation has adopted the EU-CoC.
- It would be useful to have templates for communications, texts, etc. to use in different situations to help promote the EU-CoC principles. Ideally these should be provided in the local language as well as in English.
- Periodic and continuous information about the advances and decisions taken previous to the final document/s and next steps in regulation subjects.
- Communicate examples of applications of the EU-CoC and show the benefits of using it.

##### **Workshops / Congresses**

- Dissemination and discussion of the EU-CoC at schools and universities to improve awareness of young people on these matters.
- Communicate the benefits of the EU-CoC directly to researchers or their associations in congresses, journals etc.
- Disseminate the EU-CoC using European Technology Platforms.

### Communication tools / media

- More information (and advertisement) on the EU-CoC, with tools such as: media communications, web presentations, journal articles (industrial and research oriented, as well as scientific journals), social media and blogs.
- Produce a comprehensible flyer comprising practical aspects of the EU-CoC.
- Stakeholders / target groups of the EU-CoC have to be addressed properly in all communications.
- The particular language used and the complex structure of the document have to be reviewed (Commission recommendations not in front, most important principles not in the annex, summary in the beginning, etc).

### National Level

- Translation of the EU-Communication measures to the Member States' languages.
- Implementation of a national strategy of communication, preferably with the new revised version of the EU-CoC, taking into account the participation of stakeholders.
- Systematic presentation of the EU-CoC by the governmental institutions responsible for the nano-related research.
- Organising and funding a platform with pilot projects to facilitate discussion and exchange of experiences between the researchers concerning compliance with the EU-CoC.
- Strategic implementation workshops between the coordinators of relevant research programmes funded by the national research institutions.
- Initiating "Road Shows" for students, researchers and workers about responsible research and production of nanotechnologies. Making the EU-CoC visible for them.
- National academic "days of science" which could provide a frame for the dissemination of the EU-CoC among the academic stakeholders (funding by the EU for special sessions).
- Involve "personal peers" for the national dissemination.

### Organisational Level

- Organise workshops for top managers of industrial companies, research institutes etc. targeted on open discussions on N&N legislations, standards, nano safety etc.
- Companies should incorporate the EU-CoC into their quality assurance programme and through that there will be business pressure throughout the supply chain that will help to raise the awareness of the EU-CoC.
- Safety officers in organisations can convert the EU-CoC into rules which are easy to follow by everybody. Following the rules can then be achieved by a shared group responsibility. The group leader can demand this from the employees.

Especially the non-EU countries and the European Type-B countries with a low level of nanotechnology initiatives and general awareness stressed the need for a better communication strategy. The Czech group identified it as crucial to organize a coordinated campaign of conferences, workshops and presentations in order to improve the low level of awareness. From the Republic of South Africa and from Argentina came the advice to improve the presence of the EU-CoC "*on websites of strategic organizations*" such as from national Nanotechnology Initiatives, national research funders and addresses of the broader stakeholder community instead of the formal structure in the EU-Countries. Similar comments went in from the International Stakeholder group. Here again, the key experts and their organisations identified in WP 1 of the NanoCode project could be used as a first step. Due to the fact that the structures of responsibility for

the communication and dissemination differ from country to country in the EU-Member States, the recommendation to involve key experts from strategic organisations as partners is broadly shared.

Consequences:

- ⇒ **The EU-Commission would need a funding concept if a multi-level and multi-stakeholder dialogue and communication process on the EU-CoC should be initiated and work efficiently.**
- ⇒ **Financial supports for dialogue workshops to ensure a sufficient inclusion of relevant stakeholders and for adequate information formats were broadly recommended if the awareness should improve.**
- ⇒ **Furthermore, the participants provided a list of ideas which do not need large budgets (adjustments of the Framework Programme EU-Communications,...) or, which could be integrated in existing formats (workshops, conferences, Road Shows, stakeholder initiatives,...).**

Maybe, some incentives would be a creative idea to encourage the adoption of the EU-CoC in a double sense.

### 3.3 Incentives

One of the aims of a targeted, appropriate communication strategy should be to encourage stakeholders to apply and to adopt the EU-CoC as a tool to foster the responsible development of N&N. As shown in Chapter 2.2 and in Figure 7, more than the half of the participants was convinced that the EU-CoC should have some ‘teeth’ in terms of sanctions or penalties in the case of non-compliance. A very large number of recommendations which are listed in this section present another picture. It seems that a lot of the participants are more in favour of incentives than of “disincentives”. The British group consensually draw a picture of their preferences for *“the ‘carrot’ rather than [the] ‘stick’ approach”*. In principle, a lot of interviewees shared the British view that *“encouragement in terms of good practice”* would be more useful than penalties. *“Ideally, there should be a joint/shared action at different levels (European, national, organisational)”*, the Italian group commended and suggested to couple this system with national nanotechnology strategies if existing.

The following list will provide original approaches from the different Country Reports – sometimes in an aggregated form - of *“good practice”* how to design appropriate incentives:

#### Funding

- Financial support of the EU-Commission for professional international meetings on the EU-CoC and the process of review and adjustments.

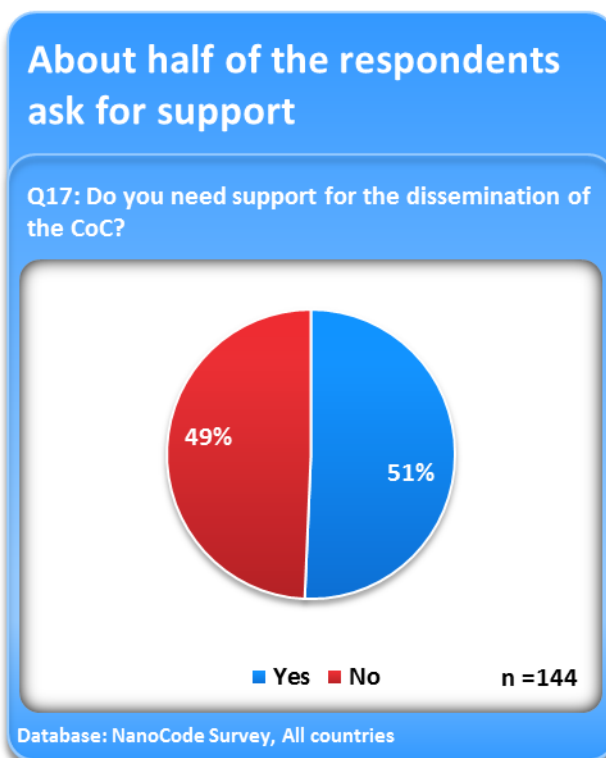


Figure 19: Support for dissemination of CoC

- Provide human resources and funding to help the stakeholders with the real adoption of EU-CoC, including a broader funding of EHS & ELSI work packages, help desk for coordinators, data pool for social scientists, provision of information material etc.
- Assistance for institutions (non-EU countries) with suboptimal infrastructure for dissemination, adoption and monitoring of compliance of the EU-CoC.

### Labels

- To introduce “positive labels” as reputational incentives through publishing lists of research institutions/researchers who have complied with the EU-CoC principles and guidelines and communicate the “best practice” examples.
- To give a quality award to those organisations complying with the principles described in the EU-CoC that serve as a distinctive signal of the confidence of their products or processes.
- An “EU Responsible” label or a “quality mark” was appraised as promising if:
  - efficient technical assistance to implement the label is proposed
  - absolute independency of the agencies in charge of certification is ensured
  - similar levels of compliance and auditing are required in all EU-countries
  - consumer confidence is ensured through effective and continuous maintenance of label value
- The approach could be similar to quality certification and may include the development and awarding of an “ethical label” for those who comply with the EU-CoC. This could also be relevant to improve the perception of nanotechnologies among the consumers.

### Structural Incentives

- Linking public funding of research projects to compliance to the EU-CoC. It has been recommended that all applications for N&N research funding should include a detailed account of how the institution/applicant ensures or will ensure compliance with the EU-CoC.
- Make the EU-CoC a part of the quality control system in internal organisational audits.
- Make specific organisational guidelines or rules according to relevant items of the EU-CoC.
- Introduce specific action lines / research programmes taking up the issues in the EU-CoC in national public R&D funding.
- Feed the EU-CoC into the standards setting procedures under CEN, ISO or national standardisation bodies.

### Involvement

- The European Parliament should demand for the application of the EU-CoC in the European countries.
- Include the research performing organisations centrally in the further process of implementation of the EU-CoC, because they know best about laboratory reality.
- Organising workshops was recommended (as mentioned above).
- Direct involvement of researchers in the development and implementation of the EU-CoC (instead of single key experts) would help to raise awareness about the EU-CoC among those affected by it and shape it in a way that is acceptable to this group.

**Summary:**

- ⇒ The described incentives of funding, positive labels, structural incentives and motivating involvement exercises offer a great variety of ‘positive thinking’ as the selected driver for societal change processes.
- ⇒ Beside of these positive elements for an encouragement of the EU-CoC, the following chapter will provide some insights into the other side of the medal. About half of the participants was convinced that “good words” – or incentives – would be not enough without disincentives.
- ⇒ Maybe it could be recommendable to follow both ways in first period, before the decision making process is closed.

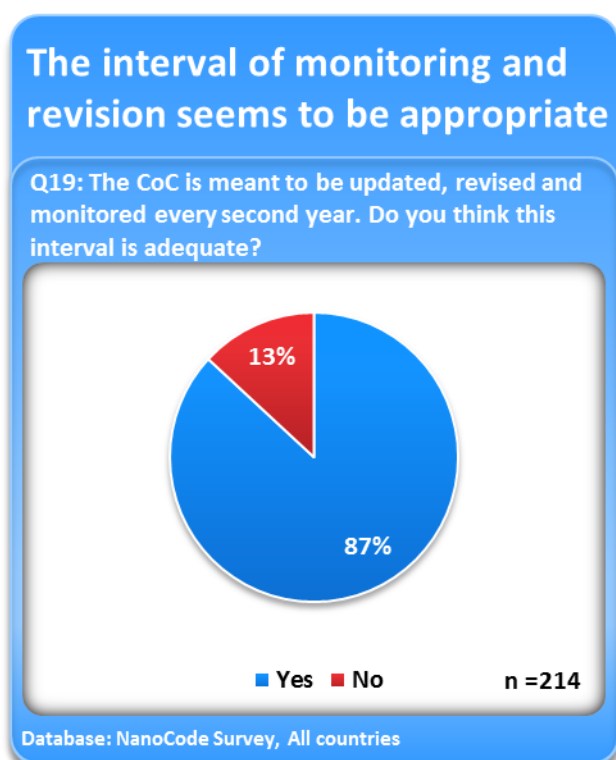
### 3.4 Monitoring and developing the “teeth”

**Monitoring**

First of all, the broad majority of participants supported the idea of having in place a monitoring system and 87% of them agreed to the intended monitoring time interval of two years. In the interviews and focus groups two different kinds of understanding of the “monitoring” issue were visible:

1. The above mentioned monitoring of the status of implementation and dissemination of the EU-CoC among Member States, organisations, and at EU level -which is required to do every two years in the EU-CoC.
2. Monitoring of compliance among those who adopted the EU-CoC (research organisations)

The participants developed several ideas in the in-depth interviews and the focus groups how monitoring systems should look like and what kind of support would be helpful:



- The monitoring system should be designed similar to an auditing procedure to ensure compliance,
- The format could be a web-based monitoring tool
- Supported by a good-practice database of concrete, easy-to-understand examples of laboratory conditions,
- Supported by a list of assisting organisations / help desks

These recommendations could be seen as suitable for two basic - and contradictive - approaches. Several comments saw the EU-CoC as a voluntary matrix for reflection and integrating ethical, social and legal issues in their field of research. In this sense, some suggested a “Self-assessment with an evaluative score to raise awareness and to find realistic actions for score improvement”. The other group – and in this case the majority of the survey participants –

Figure 20: Adequacy of CoC update interval

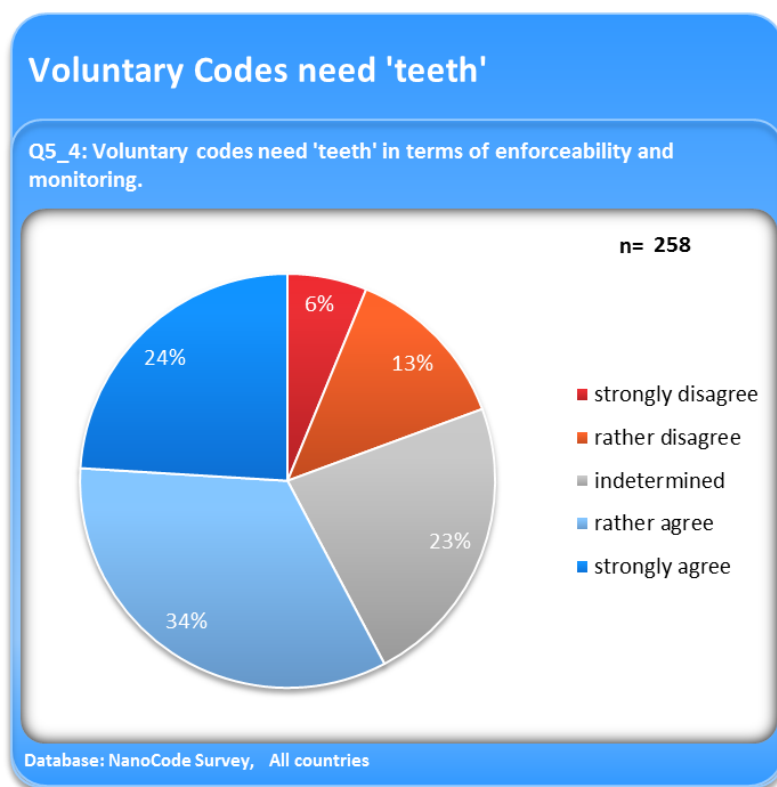


Figure 21: Voluntary Codes need 'teeth'

developed an understanding of a monitoring system coupled with sanctions.

### *How the 'toothless tiger' could get some 'fangs'*

Coming back to Question 5 (see Figure 21, as discussed in Chapter 2.2 ) only 19% of the respondents disagreed that the EU-CoC would need 'teeth'.

Therefore, one of the key questions was what the participants really associated with 'teeth' and what kind of measures they would suggest. The following list is in an ascending order - or from 'light milk teeth' to 'heavy fangs':

### **Compliance by increasing public and economic pressure**

- *Pressure from the supply chain (e.g. business opportunities)*
- *Increasing pressure from university boards on research institutes*
- *Ensuring Civil Society Organisation's (CSO) involvement*
- *Development of tailor-made CoCs for specific nano-companies or nano-clusters, negotiated with and monitored by CSOs*
- *Audits*
- *"Naming and Blaming" in case of non-compliance*

### **Linking compliance to public funding**

- *Limited access to public research funds in case of non-commitment*
- *Introduction of contractual obligations in the public funding scheme under penalty of cutting the funding if no compliance is achieved in the project*
- *Immediate suspension/termination of projects carried out in an environment not compliant to the code*

### **Mandatory compliance**

- *Incorporation of the EU-CoC into the EC Research Framework as a guideline to follow*
- *Implementation of a standard quality-management system*
- *Legal duty of compliance*

- *Mandatory adoption of the EU-CoC in the Member States*
- *Controls and sanctions (about the compliance with the EU-CoC) by authorities responsible for labour and production safety on national level*

### Conclusions:

- ⇒ Following this ascending ladder, linking the EU-CoC to ‘teeth’ would stand in contrast to its voluntary character as it has been designed by the European Commission. Applying a per se voluntary measure in the context of stringent requirements and mandatory rules will generate an area of tension which is difficult to bridge. The broad expectation towards stronger measures to enforce the compliance would imply a decision making process, if the EU-CoC should diverge from being voluntary.
- ⇒ If the EU-CoC is to remain voluntary, the concept and wording has to be reviewed with care in order to avoid wrong expectations. Additionally, a communication concept should integrate appropriate measures to encourage adoption of the EU-CoC on a voluntary basis and to reason why a mandatory Code of Conduct is not desirable.

## 3.5 Web based tools

Investigating what kind of tools could improve awareness, familiarity with the EU-CoC principles and monitor the activities in connection with adoption, the first step was to ask for the basic support of such an idea. The result was again very clear (c.f. Figure 22). 83% said that they think a web based tool could ease the assessment of compliance with the EU-CoC for their organisation. Therefore, one of the last tasks in the in-depth interviews and in the focus groups was to find out, how this web based tool could be designed.

The following list provides several interesting insights in the world of expectations. The web based tool could be:

- A tool for self-assessment with an evaluative score-system to raise awareness of specific situations and to propose realistic actions to improve the score
- A good-practice database including concrete, easy-to-understand examples of laboratory situations
  - Could be designed with a general focus (not only on research institutes)
  - Could be used to promote the CoC
  - It could be used as a review tool at the start and at the end of a project to make improvements visible
- Could be used as an external assessment tool for compliance in order to monitor research grant requests

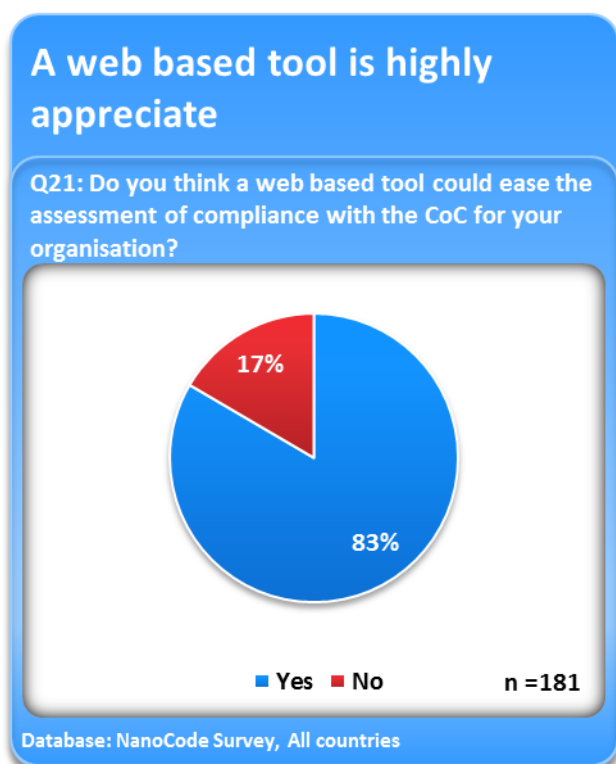


Figure 22: Need for a web based tool



- Could include an indication of compliance with existing standards on N&N
- Could demonstrate measurable procedures for the traceability/monitoring of the material/product during all the life-cycle
- Could indicate possible presence of free nanoparticles during production (and life cycle)
- It could indicate control procedures implemented
- In research projects it could give indications of the potential applications of research (to identify the possible exposure scenario) and the state of art in terms of EHS issues for the specific application considered.
- In the exploitation phase of research projects specify the level of information on EHS issues of the material/application realized
- A web-accessible database could be established so that researchers can get information about the hazardousness of a compound/material.

Some comments close this section. One participant comments the question concerning a web based tool with a sense of humor: *“Good. But first you should explain how to apply the EU-CoC. Many times the users do not know how to apply the EU-CoC.”*, and another one wondered with a similar tonality how it would be possible to measure something unknown with a web based tool. Others expressed some doubts too: *“Web based tools would be a good way of communication of the EU-CoC, but not enough for the implementation or monitoring of their use.”* Again, the participants showed a wise appraisal of what a Code of Conduct, and a related web based tool, could achieve – or not. In their view the web based tool could be used as “complementary” to other strategies of dissemination. The web based tool is not the core, as one of the participants mentioned: *“The hardest task is the process to implement it [the EU-CoC] from scratch “*

The following conclusions can be drawn from the debate about a web based tool as the final step to go into concrete:

- ⇒ **The participants of the NanoCode Survey appreciated the idea for a web based tool as an adequate way to improve a structured informational exchange and as a monitoring system.**
- ⇒ **However, the web based tool is seen as a complementary approach to the above mentioned strategies of awareness rising, of communication strategies including dialogue processes and targeted information pools, of incentives and disincentives. All of these components which could support an improved dissemination and communication, including the web based tool, would need some basic decisions in advance about the concrete profile of the EU-CoC. Several decisions have to be taken:**
  - 1. First, the European Commission and the involved parts have to decide whether the EU-CoC should be targeted for responsible science in general – or, if it should be more specific on N&N and if the explicit or implicit commitment should be measured.**
  - 2. Second, it has to be decided how ‘large’ the ‘teeth’ should be – or in better words, how far the EU would like to determine the degree of voluntariness.**



## 4 Conclusions

The NanoCode Survey has generated a plentitude of suggestions for

- ⇒ a revision of the wording of the principles and guidelines;
- ⇒ an improvement of communication and dissemination strategies on European level, national level and organisational level including strategies of awareness rising, different communication media, dialogue processes and suggestions for the design of a web based tool;
- ⇒ measurable criteria of the compliance;
- ⇒ incentives and disincentives

Thanks to the broadness of the creative input, the NanoCode Project is in the comfortable position that several appropriate measures could be selected out of these ideas and integrated into a Master Plan of recommendations for the EU Commission. However, the analysis of this Synthesis Report draw the conclusion that several necessary decisions have to be taken which will influence the frame of any further design concepts significantly. The decision could be described as a tree: Starting point is the question of the adequate target group – if the EU-CoC should be targeted to researchers only or to a broader stakeholder community. For example, the question of the responsibility over the entire life-cycle could be not addressed adequately to a basic researcher (physicians, biologists and chemist) but could be an important issue in the context of a researcher of a company which is indeed responsible for the developed products over the entire life-cycle.



Figure 23: Summary of necessary decisions

Talking about a careful revision of the principles and its guidelines and, later on, about the design of appropriate monitoring tools, it will make a difference if an explicit or implicit compliance is requested. If both ways should be able to choose, the selected criteria and examples which should be provided in the monitoring system should be suitable for each of the approaches – which is possible too. The next decision will be, if the EU-CoC should be targeted to science in general or if it should be nanospecific code. Both would be possible with an explicit or implicit compliance but the decision will influence the wording of the principles and guidelines as well. The last and maybe more crucial question will be if the EU-CoC should develop towards more “teeth” in a sense of more mandatory elements or if it should remain voluntary in a stricter sense without sanctions and penalties in the case of non-compliance.

- ⇒ All of these questions will influence the design of a Master Plan and its recommendations for the political decision making process. Furthermore, they will influence the concept of web based tool such as the “CodeMeter”. Both, a Master Plan and the CodeMeter tool have to be developed in Workpackage 3 of the NanoCode project. The challenge will be to propose solutions in a situation of uncertainty about these important decisions.
- ⇒ Finally, it could be recommended to involve a broader group of affected stakeholders in the following basic decision making processes and in the design of appropriate concepts to improve communication, commitment and compliance. In the end it should be their Code of Conduct of responsible nanosciences and nanotechnologies research.

## Interview Guideline for qualitative Interviews or Focus Groups for EU-Partners

Please start with the socio-demographic data: name / organization / stakeholder

### Part I: Description and Analysis of the current situation

1. Have you been involved in the debate about the European COC, personally?
2. Can you describe the awareness of the COC in your country and specifically in your organization?
3. What kind of activities do you know that support the dissemination of the COC? What do you think about such activities?
4. Do you agree to the principles of the COC in general? Are there any principles of the COC which raised concerns /disagreement?
5. Do your organisation / country adopt the COC or do you refer to other codes / principles / guideline with similar principles?
6. Is there any monitoring of the compliance of these voluntary codes?
7. Can you give a description of the communication strategies and the stakeholders who should be involved to support the implementation of the COC? Do you know if these people have been involved?
8. What could be possible reasons for hampering the application of the CoC?

### Part II: Recommendations

9. Are there any supporting activities you would like to recommend to improve awareness and communication (on EU-level, national level, organisational level)?
10. Let`s talk about recommendations concerning structural challenges: Do you have any suggestions who should be involved and how? Do you have any suggestions to clarify responsibilities?

11. Do you have any recommendations concerning the content / suggestions for changes?
12. What do you think about web bases tools to foster the implementation and monitoring of the COC?
13. What are requirements for a successful monitoring from your point of view (for example frequency, criteria, responsibilities)?
14. What could be useful incentives for the application / adoption of the COC (on EU level, member state level, organizational level)?
15. What do you think about sanctions or penalties?

## Interview Guideline for qualitative Interviews or Focus Groups for Non-EU-Partners

Please start with the socio-demographic data: name / organization / stakeholder

### Part I: Description and analysis of the current situation

1. Have you been involved in the debate about the European COC, personally?
2. Can you describe the awareness of the COC in your country and specifically in your organization?
3. What kind of activities do you know that support the dissemination of the CoC? What do you think about such activities?
4. Do you agree to the principles of the COC in general? Are there any principles of the COC which raised concerns /disagreement?
5. Do your organisation / country refer to other codes / principles / guideline with similar principles?
6. Is there any monitoring of the compliance of these voluntary codes?
7. Can you give a description of the communication strategies and the stakeholders who should be involved to support the debate of the COC? Do you know if these people have been involved?
8. Would you recommend adopting the COC in your country – for example in an international or national version?
9. What could be possible reasons for hampering the implementation of a COC?

## Part II: Recommendations

10. Are there any supporting activities you would like to recommend to improve awareness and communication of such a COC (on international-level, national level, organisational level)?
11. Let`s talk about recommendations concerning structural challenges: Do you have any suggestions who should be involved and how? Do you have any suggestions to clarify responsibilities?
12. Do you have any recommendations concerning the content / suggestions for changes?
13. What do you think about web bases tools to foster the implementation and monitoring of the COC?
14. What are requirements for a successful monitoring from your point of view (for example frequency, criteria, responsibilities)?
15. What could be useful incentives for the application / adoption of the COC (on international level, member state level, organisational level)?
16. What do you think about sanctions or penalties?